IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF ILLINOIS
EASTERN DIVISION

FUJITSU LIMITED, Plaintiff, v. TELLABS OPERATIONS, INC. and TELLABS, INC., Defendants.	)	
TELLABS OPERATIONS, INC. Plaintiff, v. FUJITSU LIMITED and FUJITSU NETWORK COMMUNICATIONS, INC., Defendants.	)	Nos. 08 C 3379 & 09 C 4530 Consolidated for Discovery
FUJITSU LIMITED, Counter Claimant, v. TELLABS OPERATIONS, INC., TELLABS, INC., and TELLABS NORTH AMERICA, INC., Counter Defendants.	)	

MEMORANDUM OPINION AND ORDER

JAMES F. HOLDERMAN, Chief Judge:

On January 29, 2008, Fujitsu Limited filed a complaint against Tellabs, Inc. and Tellabs Operations, Inc. in the United States District Court for the Eastern District of Texas ("Texas

Action") alleging infringement of U.S. Patent Nos. 5,526,163 ("'163 Patent"); 5,521,737 ("'737 Patent"); 5,386,418 ("'418 Patent"); and 6,487,686 ("'686 Patent").[1] (Case No. 09-4530, Dkt. No. 1, Fujitsu's Compl. ¶¶ 1, 12-35.) Tellabs Operations, Inc. then filed suit against Fujitsu Limited and Fujitsu Network Communications, Inc. (collectively "Fujitsu") in the United States District Court for the Northern District of Illinois ("Illinois Action") on June 11, 2008, alleging infringement of U.S. Patent No. 7,369,772 ("'772 Patent"). (Case No. 08-3379, Dkt. No. 1, Tellabs's Compl. ¶ 1.) Both Fujitsu Limited and Fujitsu Network Communications, Inc. filed their amended answers, affirmative defenses, and counterclaims in the Illinois Action on April 1, 2009. (Dkt. Nos. 119, 120.) In its counterclaims, Fujitsu Limited alleged that Tellabs Operations, Inc., Tellabs, Inc., and Tellabs North America (collectively "Tellabs") infringed two additional patents assigned to Fujitsu Limited: U.S. Patent Nos. 7,227,681 ("'681 Patent") and 5,533,006 ("'006 Patent"). (Dkt. No. 119.)

On May 13, 2009, this court issued its preliminary claim constructions of certain disputed claim terms in the '772, '681, and '006 Patents. (Case No. 08-3370, Dkt. No. 145 ("Prelim. Constr. Op.").) The Texas Action subsequently was transferred to the Northern District of Illinois on July 29, 2009, and the two cases were consolidated before this court for purposes of discovery. (Case No. 08-3379, Dkt. No. 202.) After the cases were consolidated, this court held a three-day technology tutorial related to the general technology underlying the six patents-in-suit.

The parties then identified additional claim terms for the court to construe and filed briefs

[1] Fujitsu Limited's claim for infringement of the '686 Patent was dismissed on November 4, 2010. (*See* Case No. 09-4530, Dkt. No. 249.)

related to those proposed constructions. Tellabs also filed two motions for summary judgment: Tellabs's "Motion for Summary Judgment of Invalidity Based on Indefiniteness of All Asserted Claims (1 and 6-9) of U.S. Patent No. 5,386,418" (Case No. 09-4530, Dkt. No. 165) and its "Motion for Summary Judgment of Invalidity Based on Indefiniteness of All Claims of U.S. Patent 5,533,006" (Case No. 08-3379, Dkt. No. 305). Fujitsu then filed its "Motion for Summary Judgment for Judicial Correction of 'And' to 'A' in Claim 1 of U.S. Patent 5,386,418" (Case No. 09-4530, Dkt. No. 202 ("Fujitsu's Mot.")). On November 30 and December 1, 2, 3, and 7, 2010, the court held a *Markman* hearing, during which the parties' counsel addressed the respective claim construction positions as well as parties' motions for summary judgment. The parties have presented the court with over 900 pages of demonstrative slides, nearly 400 pages of briefing, and a multitude of exhibits, addressing their respective claim construction positions.

On March 31, 2011, this court issued its Memorandum Opinion an Order denying Tellabs's "Motion for Summary Judgment of Invalidity Based on Indefiniteness of All Asserted Claims (1 and 6-9) of U.S. Patent No. 5,386,418" and granting Fujitsu's "Motion for Summary Judgment for Judicial Correction of 'And' to 'A' in Claim 1 of U.S. Patent 5,386,418." (Case No. 09-4530, Dkt. No. 305). That same day, the court issued its Memorandum Opinion and Order granting Tellabs's "Motion for Summary Judgment of Invalidity Based on Indefiniteness of All Claims of U.S. Patent 5,533,006." (Case No. 08-3379, Dkt. No. 369.)

The court now sets forth its constructions of the nineteen remaining disputed claim terms in the '418, '163, '737, '681, and '772 Patents.

LEGAL STANDARDS

Claim construction is a matter of law for the court. *Markman v. Westview Instruments*,

Inc., 517 U.S. 370, 390-91 (1996). "It is a 'bedrock principle' of patent law that 'the claims of a patent define the invention to which the patentee is entitled the right to exclude.'" *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312 (Fed. Cir. 2005) (quoting *Innova/Pure Water, Inc. v. Safari Water Filtration Sys., Inc.*, 381 F.3d 1111, 1115 (Fed. Cir. 2004)). In construing a patent's claims, the court gives claim terms their "ordinary and customary meaning," which is "the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention." *Id.* at 1312-13. The ordinary and customary meaning of a claim term is determined in light of the entire intrinsic evidence, i.e., the claims, the specification, and the prosecution history. *Id.* at 1313-17. Usually, the specification "is the single best guide to the meaning of a disputed term." *Id.* at 1315 (citation omitted). However, "[t]here is a fine line between construing the claims in light of the specification and improperly importing a limitation from the specification into the claims," *Retractable Techs., Inc. v. Becton*, Case No. 2010-1402, 2011 WL 2652448, at *8 (Fed. Cir. July 8, 2011), and "[g]enerally, a claim is not limited to the embodiments described in the specification unless the patentee has demonstrated a 'clear intention' to limit the claim's scope with 'words or expressions of manifest exclusion or restriction.'" *i4i Ltd. P'ship v. Microsoft Corp.*, 598 F.3d 831, 843 (Fed. Cir. 2010) (quoting *Liebel-Flarsheim Co. v. Medrad, Inc.*, 358 F.3d 898, 906 (Fed. Cir. 2004)).

The prosecution history also "provides evidence of how the PTO [U.S. Patent and Trademark Office] and the inventor understood the patent" and "can often inform the meaning of the claim language by demonstrating . . . whether the inventor limited the invention in the course of prosecution." *Phillips*, 415 F.3d at 1317. Nevertheless, "because the prosecution history represents an ongoing negotiation between the PTO and the applicant, rather than the final

product of that negotiation, it often lacks the clarity of the specification and thus is less useful for claim construction purposes." *Id.*

Finally, the court can rely on extrinsic evidence such as "expert and inventor testimony, dictionaries, and learned treatises" in construing a patent's claims. *Id.* (citation omitted). Such extrinsic evidence "can shed useful light on the relevant art" but is "less significant than the intrinsic record in determining the legally operative meaning of claim language." *Id.* (citations omitted).

ANALYSIS

I. '418 Patent

A. Background

The '418 Patent is titled "Method for Synchronizing Synchronous Data Communication Network and Communication Device Used in the Synchronous Data Communication Network." It issued on January 31, 1995, and is assigned to Fujitsu Limited. The '418 Patent relates to synchronous data communication networks, including networks using fiber optics to transmit high-speed digital signals, such as those used in cable television transmissions.

The acronym "SONET" is one of the known high-speed networks that transmits large capacities of information and stands for "Synchronous Optical Network." (2/23/10 Tech. Tutorial Tr. 327:13-15; '418 Patent, col.1 ll.32-34.) The SONET system is comprised of various stations or nodes connected via lines for transmitting and receiving information. In a SONET system, information is transmitted in frames, and each frame is organized into bytes. The frame structure is two-dimensionally depicted in graphic form as a matrix containing three main areas: (1) section overhead, (2) line overhead, and (3) synchronous payload envelop, which includes

the transmitted customer data and a path overhead. (*See* 08-3379, Dkt. No. 263 ("Fujitsu's '006 and '418 Patent Tutorial") 15; 2/23/10 Tech. Tutorial Tr. 330:11-331:9; '418 Patent, Fig. 1 (depicting a frame matrix).) In the SONET system, a frame is transmitted row by row, one byte at a time, moving from the upper left corner of the frame to the lower right corner. (Fujitsu's '006 and '418 Patent Tutorial 16; 2/23/10 Tech. Tutorial Tr. 331:10-18.)

The rate of delivery for transmitting the frames is driven by a clock source, i.e. an oscillator, which could come from an external timing source, a clock from the incoming bit stream (i.e., line timing), or the station's own internal clock (i.e., internal timing). (Fujitsu's '006 and '418 Patent Tutorial 23; 2/23/10 Tech. Tutorial Tr. 335:15-24.) During the operation of the system, the availability of a clock source may change. (2/23/10 Tech. Tutorial Tr. 342:17.) The '418 Patent discloses the sending of a "flag bit data" between the stations in the SONET system to indicate whether a clock source is available. (*Id.* at 342:7-11.) In a SONET system, the flag bit data–also referred to in SONET as a "synchronous status message" or "SSM"–is carried in the frame line overhead, which includes the information used by the network that is invisible to the network's customers. (2/23/10 Tech. Tutorial Tr. 343:9-23; Fujitsu's '006 and '418 Tutorial 17, 27.)

According to the '418 Patent, an object of the invention

> is to provide a synchronizing method of a synchronous data communication network in which a plurality of synchronizing signal sources are provided in a data communication network and data communication is maintained upon an occurrence of a failure by efficiently switching among the synchronizing signal sources in response to the failure that occurred, as well as to provide a communication apparatus used in such a synchronous data communication network.

'418 Patent, col.2 ll.45-54.

Independent claim 1 of the '418 Patent recites:

> A method of switching from one synchronizing signal source to another in a synchronous data communication network including a plurality of stations with at least one child station and at least one parent station connected to each other via lines, and a plurality of synchronizing signal sources provided for said stations, the method comprising, in combination, steps of:
>
> (a) setting, in a signal transmitted via said lines and including synchronizing information related to one of said plurality of synchronized signal sources, a *flag bit data* indicative of whether or not timing of said one of the plurality of synchronizing signal sources related to said synchronizing information transmitted via said lines can be used as a synchronizing signal source on each station which receives said information transmitted via said lines;
>
> (b) referring each station, from among said plurality of stations on the basis of said flag bit data, to a *table* provided in each said station for specifying an order of priority for selection of a synchronizing signal source, upon occurrence of a predetermined event in any of said plurality of synchronizing signal sources, and for selecting a synchronizing signal source; and
>
> (c) *switching each station* from the currently selected synchronizing signal source to the synchronizing signal source selected in said step (b).

Id. at col.18 l.51-col.19 l.9 (emphasis added). Step (a) in claim 1 originally read "setting . . . and flag bit data," but was corrected by a PTO issued Certificate of Correction to instead read "setting . . . a flag bit data." This court performed the same correction in its March 31, 2011 Order. (Case No. 09-4530, Dkt. No. 305.)

B. Person of Ordinary Skill in the Art

Based on the parties' proposals, the court finds that a person of ordinary skill in the art with respect to the '418 Patent had (1) at least four years of experience in synchronization techniques for synchronous optical networks, or (2) a Bachelor's degree in systems engineering or electrical engineering with at least two years of experience either in synchronization techniques for synchronous optical networks or in researching and designing components for

synchronous optical networks.

C. Claim Constructions

The parties have identified the following three claim terms in the '418 Patent for the court's construction: "flag bit data" (claims 1, 6-9); "switching each station" (claim 1); and "table" (claim 1).[2]

1. "flag bit data" (claims 1 & 6-9)

The term "flag bit data" appears in claims 1, 6-9 of the '418 Patent. Fujitsu's proposed construction of "flag bit data" is "a predetermined code occupying a fixed position in each frame and is provided in a predetermined position of the overhead (i.e., not the payload)." (Case No. 09-4530, Dkt. No.195 ("Fujitsu's Resp.") 47.) Tellabs, on the other hand, relies on the uncorrected phrase "and flag bit data" in claim 1 to contend that the term "flag bit data" is indefinite. (Case No. 09-4530, Dkt. No. 164 ("Tellabs's Op. Br.") 43.) As stated above, in its March 31, 2011 Order, this court corrected the phrase "and flag bit data" in claim 1 of the '418 Patent to read "a flag bit data." (*See* Case No. 09-4530, Dkt. No. 305.) As a result, the court finds that the term "flag bit data" is not indefinite. For the following reasons, this court adopts Fujitsu's proposed construction of the term "flag bit data" with minor alteration and construes "flag bit data" to mean "a predetermined code that occupies a fixed position in each frame and is provided in a predetermined position of the overhead (i.e. not the payload)."

The specification provides an express definition of "flag bit data" which is consistent with Fujitsu's proposed construction:

---

[2] The parties originally also identified the word "and" as used in "setting . . . *and* flag bit data" in claim 1. Based on this court's March 31, 2011 Order replacing the word "and" with "a," this term no longer requires the court's construction.

> The flag bit data *is defined such that it occupies a fixed position in each frame* (for example, the aforementioned reserved bit Z1). Accordingly, each station separates the frame multiplexed line signal into frames so as to detect the flag bit data. Moreover, *the flag bit data contains a predetermined code* consisting, for example, of only "1's" or of only "0's."

'418 Patent, col.17 ll.52-58 (emphasis added).

The specification additionally explains that the "Z1" bit referenced in the above excerpt is located in a defined position in the overhead of a frame:

> A synchronizing bit data for transmitting the synchronizing signal and a flag bit data indicating availability/non-availability of the synchronizing signal *are provided in a predetermined position of the overhead* of the signal transmitted through the stations in the digital communication network of the present invention. For example, the aforementioned reserved byte Z1 may be used.

Id. at col.6 ll.11-18 (emphasis added).

Tellabs has not presented any arguments challenging Fujitsu's proposed construction, other than to argue that the term cannot be construed. The court finds that Fujitsu's construction is consistent with the intrinsic evidence, particularly the '418 Patent's specification. Consequently, the court construes the term "flag bit data" to mean "a predetermined code which occupies a fixed position in each frame and is provided in a predetermined position of the overhead (i.e. not the payload)."

2. "switching each station" (claim 1)

The claim term "switching each station" appears in step (c) of claim 1 of the '418 Patent: "(c) *switching each station* from the currently selected synchronizing signal source to the synchronizing signal source selected in said step (b)." *Id.* at col.19 ll.7-9. According to Fujitsu, "switching each station" means "switching each station which receives said information transmitted via said lines (as recited in step (a) of claim 1)." (Fujitsu's Resp. 38.) Tellabs, however, contends that the proper construction is "switching every station of the plurality of stations." (Tellabs's Op. Br. 41.) The parties' primary dispute as to this claim term centers around whether *every* station must switch its synchronizing signal source. As explained below, the court agrees with Fujitsu and construes the claim term "switching each station" to mean "switching each station which receives said information transmitted via said lines (as recited in step (a) of claim 1)."

Looking first to the claim language, the network described in claim 1 includes "a plurality of stations with at least one child station and at least one parent station." '418 Patent, col.18 ll.53-54. The claim term "each station" appears in steps (a), (b), and (c) of claim 1:

> (a) setting . . . a flag bit data indicative of whether or not a timing of said one of the plurality of synchronizing signal sources related to said synchronizing information transmitted via said lines can be used as a synchronizing signal source on *each station* which receives said information transmitted via said lines;
>
> (b) referring *each station* from among said plurality of stations on the basis of said flag bit data, to a table . . . ; and
>
> (c) switching *each station* from the currently selected synchronizing signal source selected in said step (b).

Id. at col.18 l.58-col.2 l.9 (emphasis added).

Fujitsu argues that "each station" in step (c) refers to "each station" recited in step (a).

Tellabs, however, contends that the "each station" in step (c) refers to the "plurality of stations" recited in the preamble of claim 1 and thus requires the switching of "every station of the plurality of stations." The court agrees with Fujitsu's interpretation of claim 1 because the term "each station" appearing in step (c) clearly refers to "each station which receives said information transmitted via said lines" recited in step (a) of claim 1. In other words, not every station in the network must switch its synchronizing signal source as Tellabs contends. Only the station or stations receiving the transmitted synchronizing information must switch because the term "switching each station" in step (c) refers only to those stations which receive the transmitted synchronizing information.

This interpretation of "switching each station" comports with the teachings of the specification. Although the specification does disclose embodiments where all the stations ultimately do switch their signal sources, *see* '418 Patent, Figs. 3-14 (disclosing first embodiment); Figs. 37-42 (disclosing fifth embodiment), the court finds that rather than limiting the claims, these embodiments instead merely illustrate the various ways in which the stations in a network system respond to the unavailability of different signal sources. Switching depends on which signal source becomes unavailable and where the available signal source is located in the system as well as the configuration of nodes in the system. For example, the unavailability of the parent station's external clock will affect the system differently than the unavailability of a signal source between two child stations. *See id.* at Figs. 4-19, 22-42.

Additionally, the specification draws a distinction between the station sending the flag bit data and the stations receiving that data:

> The present invention allows the parent station A to send, during normal operation, a flag bit data S, indicating that the synchronizing signal thereof is available, to all of its neighboring stations, and to send, when there is a failure in the synchronizing signal source, a flag bit data *S indicating that the same signal is not available.

Id. at col.5 ll.21-27. After receiving the signal indicating the availability of the synchronizing signal source, "the child stations B, C, D selects [sic], from among the neighboring stations having their flag bit data indicating that their synchronizing signal is available, a station to receive the synchronizing signal from, the selection being based on the order of priority specified in the table." *Id.* at col.5 ll.29-34. The specification, therefore, distinguishes between the station *sending* the information (e.g., the parent station) and the stations *receiving* the information (e.g., the child stations), which are the stations that switch their synchronizing signal source if the flag bit data indicates that the current source is unavailable. In other words, not *every* station in the network receives the transmitted synchronizing information as recited in step (a) of claim 1, and consequently step (c) of claim 1 does not require *every* station to switch its synchronizing signal source. Based on the specification, the court finds that a person of ordinary skill would not understand that "switching each station," as recited in step (c) of claim 1 requires every station in the network to switch.

The parties have not identified anything in the prosecution history that supports their respective constructions. Yet, the court has considered Tellabs's additional arguments for requiring that every station of the plurality of stations switch its synchronizing signal source and finds that those arguments similarly lack merit. Consequently, based on the intrinsic evidence, the court finds that Fujitsu's proposed construction is consistent with the plain language of the claims and is confirmed by the teachings of the specification. To require that "every station"

switch its signal source, as Tellabs proposes, would improperly import a limitation into the claims. The court, therefore, construes "switching each station" to mean "switching each station which receives said information transmitted via said lines (as recited in step (a) of claim 1)."

3. "table" (claim 1)

The claim term "table" appears in claim 1 of the '418 Patent. Fujitsu proposes that the court construe "table" to mean "a list of data stored in memory." (Fujitsu's Resp. 28.) Tellabs, however, contends that "table" is "a data structure containing stored data elements and corresponding labels or indices." (Tellabs's Op. Br. 38.) The parties' dispute on this term centers around whether the table must include labels or indices or could instead be a single column, such as a list. As explained below, the court construes "table" to mean "a list of data stored in memory."

Step (b) in claim 1 recites:

> [R]eferring each station, from among said plurality of stations on the basis of said flag bit data, to a *table* provided in each said station *for specifying an order of priority for selection of a synchronizing signal source*, upon occurrence of a predetermined event in any of said plurality of synchronizing signal sources, and *for selecting a synchronizing signal source*.

'418 patent, col.18 l.67-col.19 l.6 (emphasis added). Based on the claim language, the stations rely on the table for "specifying an order of priority for selection of a synchronizing signal source" and "selecting a synchronizing signal source." Fujitsu argues that a list of data would fulfill these requirements. Tellabs, on the other hand, argues that a list alone "does not provide an order of priority." (Case No. 09-4530, Dkt. No. 220 ("Tellabs's Reply") 45.) Instead, accordingly to Tellabs, labels or indices are also necessary to prioritize the signal sources. (*Id.)* Tellabs further contends that the table must include "usage and availability labels" indicating

whether a signal source is available to specify the order of priority *for selection of a synchronizing source*. (*Id.* at 46.) In other words, without labels identify the usage and availability of the signal source, the table does not assist in the selection of a synchronizing source.

The plain language of claim 1 explains that the "table"is used for "specifying an order of priority for selection of a synchronizing signal source" and "for selecting a synchronizing signal source." The claim does not expressly require that the "table" provide information regarding the availability and usage of the signal source and therefore does not support Tellabs's position that the "table"must include such labels or indices indicating the source's availability and usage. Moreover, the court agrees with Fujitsu that a single list without labels or indices specifies an order of priority, e.g., highest to lowest or first to last, as required by claim 1.

The specification similarly does not warrant a narrower construction of "table." First, the specification discloses embodiments where the selecting station references the tableonly to ascertain the order of priority–not the availability or usage of the synchronizing signal source–and then independently determines whether the signal is available:

> FIG. 5 illustrates the second stage of a failure that follows the stage shown in FIG. 4. The station B, which has received the flag bit data *S from the adjacent station A to the E direction, *refers to the order of priority specified in the table T-B and checks the station C to the W direction. Since, however, the flag bit data *S is detected again, the station B selects the internal synchronizing signal source INT* and changes the flag bit data supplied to the station C, from S to *S.

'418 Patent, col.7 ll.3-11. In this embodiment, station B does not rely on the table to determine the availability or usage of the signal source but rather "checks the station C to the W direction" to detect the flag bit data which indicates the availability of the source. Thus, one of ordinary

skill, having reviewed the specification for the '418 Patent, would understand that the "table" need not include information identifying the availability and usage of the signal source.

Second, the specification depicts tables where the order of priority is identified by a list of synchronizing signal sources without corresponding labels or indices specifying the priority of those sources. For example, Figures 3-19 of the '418 Patent disclose tables where the order of priority of the signal source is conveyed simply by arranging the sources from top to bottom in the table. Although Tellabs is correct that these tables additionally include a first column that refers to the usage and availability of the signal source, as discussed above, the specification does not require that the table include such information.

The court has also considered that parties' proffered dictionary definitions to assist in determining the ordinary and customary meaning of "table" to a person of ordinary skill. "Dictionaries or comparable sources are often useful to assist in understanding the commonly understood meaning of words . . . ." *Phillips*, 415 F.3d at 1322. In this case, the court finds that the dictionary definitions provided by the parties further confirm that Tellabs's proposed construction of "table" is overly narrow.

For example, the *McGraw-Hill Dictionary of Scientific and Technical Terms* (4th ed. 1989), cited by Tellabs, defines a table as "[a] set of continuous, related items, each uniquely identified either by its relative position in the set or by some label." *Id.* (attached as Ex. 10 to Tellabs's Op. Br.). Similarly, *The New IEEE Standard Dictionary of Electrical and Electronic Terms* (5th ed. 1993), also cited by Tellabs, defines "table" as "[a] collection of data in which each item is uniquely identified by a label, by its position relative to other items, or by some other

means." *Id.* (attached as Ex. 11 to Tellabs's Op. Br.). Neither of these definitions indicates that a table necessarily includes labels. Instead, based on these definitions, labels are one of multiple possibilities for organizing data in a table. In addition to labels, the data may be identified "by its position relative to other items" or "by its relative position in the set," both of which support Fujitsu's contention that the "table"could consist of a single column. Lastly, *The Harper Collins Dictionary of Computer Terms* (1991), cited by Fujitsu, defines "table" as "a list of data stored in memory." *Id.* at 236 (attached as Ex. B-3 to Fujitsu's Resp.).

Based on the above evidence, the court finds that it can ascertain the meaning of "table" to a person of ordinary skill without considering the additional extrinsic evidence presented by the parties. To a person of ordinary skill in the art at the time of the invention disclosed in the '418 Patent, the term "table," as used in the '418 Patent, is data stored in memory in the form of either one or multiple columns and does not necessarily include labels or indices. Consequently, the court adopts Fujitsu's proposed construction and construes "table" to mean "a list of data stored in memory."[3]

III. '772 Patent

A. Background

The '772 patent was issued to Tellabs Operations, Inc. on May 6, 2008, and is titled "Optical Line Terminal Arrangement, Apparatus and Methods." Ornan A. Gerstel and Rajiv

[3] Initially, Tellabs disputed whether the "table"was "stored in memory." (*See* Tellabs's Op. Br. 40.) Tellabs, however, did not pursue this issue during the claim construction hearing and thus appears to agree with Fujitsu that the "table"is stored in memory.

Ramaswami are the named inventors. The '772 Patent claims priority to non-provisional application 09/293,775, filed on April 19, 1999, and to provisional application 60/112,510, filed on December 14, 1998.

The '772 Patent is directed to various configurations of a wavelength division multiplexing ("WDM") optical add/drop multiplexing system that adds, drops, or passes through optical signals at corresponding wavelengths and to the related methods for adding, dropping, and passing through WDM optical signals. In a typical optical communication system, a number of stations or nodes transmit data to and receive data from adjacent nodes in the system using optical signals. (9/23/09 Tech. Tutorial Tr. 46:25-47:5.) According to the '772 Patent, the prior art WDM systems required *all* wavelengths "to pass through from a source optical node to a predetermined sink optical node." '772 Patent, col.1 ll.38-40. The invention disclosed in the '772 Patent purports to advance the prior art by "*selectively* pass[ing]-through" individual wavelengths or "add[ing] or drop[ing] individual wavelengths at selected optical nodes." *Id.* at col.1 ll.41-43 (emphasis added). At a basic level, in a WDM system like the one disclosed in the '772 Patent, multiple optical signals are generated, multiplexed (i.e., combined) to form an optical signal comprised of the individual optical signal channel wavelengths, transmitted, and then demultiplexed (i.e., separated) into individual channel wavelengths. (*See* Case No. 08-3379, Dkt. No. 204 ("Willner Tutorial") 24-26.) The demultiplexed wavelengths can be added to or dropped from the node or passed through the node depending on their ultimate destination in the network. (*See id.*)

The Abstract for the '772 Patent provides the following description of the invention:

> A wavelength division multiplexed optical communication system including a first optical line interface optically coupled to a first transponder and an optical demultiplexer through which the first optical line interface is not optically coupled to the first transponder. The system also includes a second optical line interface and at least one switch. The switch is operable to optically couple the second optical line interface to (a) the first optical line interface through at least the optical demultiplexer, and alternatively (b) the second transponder. A method for an optical add/drop multiplexing system also is provided.

'772 Patent, Abstract.

Independent claim 1 of the '772 Patent is representative of the asserted apparatus claims:

> A wavelength division multiplexed optical communication system comprising:
>
> a first *optical line interface* optically coupled to a first *transponder*;
>
> a first *local port* optically coupled to the first *transponder*;
>
> *an optical demultiplexer through which the first optical line interface is not optically coupled to the first transponder*;
>
> a second *optical line interface*;
>
> a second *local port* optically coupled to a second *transponder*; and
>
> at least one switch operable to optically couple the second *optical line interface* to (a) the first *optical line interface* through at least the optical demultiplexer, and alternatively (b) the *second transponder*.

Id. at col.7 ll.1-17 (emphasis added).

Independent claim 17 of the '772 Patent is representative of the asserted method claims:

> A method for an optical add/drop multiplexing system in a wavelength division multiplexed (WDM) optical network environment, comprising the steps of:
>
> establishing at least a first optical path extending from a first optical line interface of the system to a local transponder;
>
> establishing at least a second optical path that in a first state of the system extends from a local transponder to a second optical line interface of the system and is established by at least an optical switch, and in a second state of the

> system the second optical path alternatively extends from the first optical line interface to the second optical line interface and is established by at least both the optical switch and an optical demultiplexer through which the first optical path does not extend;
>
> in the first state of the system, communicating a wavelength along the second optical path to add the wavelength to a WDM signal the system transmits to a WDM network from the second optical line interface; and
>
> in the second state of the system, alternatively communicating along the second optical path a wavelength of a WDM signal received from a WDM network at the first optical line interface to optically pass the wavelength to a WDM signal the system transmits to a WDM network from the second optical line interface.

Id. at col.9 l.58-col.10 l.17.

B. Status of Reexamination Proceedings

Fujitsu filed a Request for *Inter Partes* Reexamination of the '772 Patent with the PTO on July 2, 2009, and the PTO granted that request. (Case No. 08-3379, Dkt. No. 322 ("Tellabs's Resp.") 1.) During the inter partes reexamination proceedings, Tellabs cancelled claims 1 and 3-5, and on June 24, 2010, the PTO issued an Action Closing Prosecution which confirmed the patentability of claims 2 and 6-24 without amendment. (*Id.* at 2.) Fujitsu has appealed that decision to the PTO Board of Patent Appeals and Interferences, and the appeal remains pending. (Case No. 08-3379, Dkt. No. 423 ("Tellabs's Reexam Status") at 2.)

Fujitsu also filed a Request for *Ex Parte* Reexamination of the '772 Patent on December 9, 2009, which the PTO ultimately granted in part with respect to claims 14-16 of the '772 Patent. (Case No. 09-4530, Dkt No. 298 ("Fujitsu's Reexam Status") 2-3.) The PTO issued an *Ex Parte* Reexamination Certificate dated May 27, 2011, reflecting Tellabs's cancellation of claims 14-16 of the '772 Patent during reexamination. (*See* Tellabs's Reexam Status 2.) To date, claims 2, 6-13, and 17-24 of the '772 Patent remain pending before this court. In the

court's discussion below, the court must refer to now-cancelled independent claim 1 because claim 2, which Tellabs still asserts against Fujitsu, depends from claim 1.

C. Person of Ordinary Skill in the Art

After extensively reviewing the record, the court has been unable to locate any proposed definition of a person of ordinary skill in the art of the '772 Patent proposed by Fujitsu. The court accordingly adopts Tellabs's proposed definition, which provides that one of ordinary skill "had at least a Master's degree in electrical engineering, or the equivalent, and two to five years of experience researching or designing optical communication systems and the components" for such systems. (Tellabs's Resp. 3.)

D. Claim Constructions

The parties have identified the following eight claim terms in the '772 Patent for the court's construction: "optical demultiplexer" (claims 2, 6-13 & 17-24); "optical line interface" (claims 2, 6-13 & 17-24); "optical demultiplexer through which the first optical line interface is not optically coupled to the first transponder" (claim 2 & 6-13) and "optical demultiplexer through which the first optical path does not extend" (claims 17-24); "transponder" (claims 2, 6-13 & 17-24); "local port" (claim 2); "modular card" (claims 11-13, 22 & 24); and "office/reside in the same office (claims 8 & 21)."[4]

[4] Originally, the parties also identified "bidirectional optical line interface," appearing in claims 14-16, as a term for the court's construction. Because Tellabs cancelled claims 14-16 during the reexamination of the '772 Patent, the court has not construed "bidirectional optical line interface." Additionally, the court's references to the claims in which certain claim terms appear only include those claims that currently remain pending.

1. "optical demultiplexer" (claims 2, 6-13 & 17-24)

The claim term "optical demultiplexer" appears in claims 2, 6-13, and 17-24 of the '772 Patent. In its preliminary construction, this court construed the claim term "optical demultiplexer" to mean "a device that receives a plurality of wavelengths multiplexed together as an optical signal and outputs each of the plurality of wavelengths as at least one of the following: (a) individual wavelengths, (b) bands of wavelengths or (c) a combination of bands and individual wavelengths." (Prelim. Constr. Op. 10.)

Fujitsu argues that the court should modify its previous construction to require that the optical demultiplexer receives its input on a single optical waveguide and that the optical signal input be comprised of N optical wavelength channels. Fujitsu accordingly proposed the following construction of "optical demultiplexer": "a device that receives a single optical waveguide carrying an optical signal having N optical wavelength channels and outputs the N wavelength channels on individual optical waveguides, where the device outputs each of the N wavelengths as at least one of the following: (a) individual wavelengths, (b) bands of wavelengths or (c) a combination of bands and individual wavelengths." (Case No. 08-3379, Dkt. No. 335 ("Fujitsu's Reply") 33 & n.65.)[5] This amendment to the court's preliminary construction, Fujitsu contends, reflects the ordinary and customary meaning of "optical demultiplexer" and to prevents the

[5] Fujitsu's proposed construction "optical demultiplexer" originally read: "A device that receives a single optical *fiber* carrying an optical signal having N optical wavelength channels and outputs the N wavelength channels on individual optical *fibers* . . ." (Case No. 08-3379, Dkt. No. 298 ("Fujitsu's Op. Br.") 27 (emphasis added).) In its Reply, Fujitsu modified its construction, replacing "fiber" and "fibers" with "waveguide" and "waveguides." (Fujitsu's Reply 33 & n.65.)

optical demultiplexer from reading on an optical multiplexer or a router, which are devices having multiple inputs. (Case No. 08-3379, Dkt. No. 298 ("Fujitsu's Op. Br.") 38-42.)

Tellabs, however, argues that these limitations in Fujitsu's construction are not supported by either the intrinsic or extrinsic evidence and improperly impose structural limitations on the term. (Tellabs's Resp. 21-22.) Tellabs instead submits that the court should maintain its preliminary construction with minor amendment: "a device that receives a plurality of wavelengths multiplexed together as an optical signal and ~~outputs each of~~ separates the plurality of wavelengths ~~as~~ into at least one of the following: (a) individual wavelengths, (b) bands of wavelengths or (c) a combination of bands and individual wavelengths." (Tellabs's Resp. 19.) According to Tellabs, with this minor modification, its proposed construction differentiates a "optical demultiplexer," which separates the wavelengths, from an optical multiplexer which combines the wavelengths. Having reviewed the parties' respective positions, the court modifies its construction of the term "optical demultiplexer" to mean:

> A device that receives a single optical waveguide carrying an optical signal having N optical wavelength channels and outputs the N wavelength channels on individual optical waveguides, where the device outputs each of the N wavelengths as at least one of the following: (a) individual wavelengths, (b) bands of wavelengths or (c) a combination of bands and individual wavelengths.

The court's construction of "optical demultiplexer" requires the resolution of two primary issues: first, whether the optical demultiplexer has a single input; and second, whether that input must be a waveguide. First addressing the claims, the plain language of the claims does not reference the optical demultiplexer's input. The specification, however, illustrates that a person of ordinary skill would understand the "optical demultiplexer" to have a single waveguide input.

In the "Background of Invention" section, the '772 Patent explains that "[i]n a WDM system optical signal channels are generated, multiplexed to form an optical signal comprised of the individual optical signal channels, *transmitted over a single waveguide*, *and demultiplexed* such that each channel wavelength is individually routed to a designated receiver." '772 Patent, col.1 ll.29-34 (emphasis added). The specification also discloses that optical demultiplexer receiving the optical signals over a "single optical fiber," which is a type of waveguide. (*See* 12/3/10 *Markman* Tr. 490:3-6 (recognizing that "waveguides" is broader than "optical fibers").) The following embodiment, for example, includes optical wavelengths on "a single optical fiber" being demultiplexed:

> The OLT 2 has an input/output line interface 4 which is connected to an external fiber facility and transmits/receives an optical signal having N optical wavelengths, for example 32 wavelengths, on a single optical fiber which is multiplexed/demultiplexed by a multiplexer/demultiplexer 6, which outputs demultiplexed wavelengths λ1-λN on individual optical fibers.

'772 Patent, col.2 ll.38-46; *see also id.* at col.3 ll.61-63; col.4 ll.16-20. Tellabs has not directed the court to any evidence in the specification that identifies a non-waveguide input for the demultiplexer.

This interpretation of the customary meaning of optical demultiplexer to a person of ordinary skill is also consistent with *Optical Networks*, a cited prior art reference that was co-authored by Dr. Rajiv Ramaswami, one of the named inventors of the '772 Patent. The parties agree that *Optical Networks* reflects the understanding of a person of ordinary skill at the time of the invention. (*See* Fujitsu's Op. Br. 39; Tellabs's Resp. 25.) *Optical Networks* explains that "[a] multiplexer combines signals at different wavelengths on its input ports onto a common output port, and a demultiplexer performs the opposite function." *Optical Networks* 90 (1st ed. 1998)

(attached as Ex. A-5 to Fujitsu's Op. Br). *Optical Networks* also explains that the demultiplexer receives the multiple wavelengths on a single fiber in describing Figure 3.6: "A multiplexer, which combines multiple wavelengths into a single fiber. In the reverse direction, the same device acts as a demultiplexer to separate the different wavelengths." *Optical Networks* 116 (2d ed. 2002) (attached as Ex. B-13 to Fujitsu's Op. Br.). Additionally, as Tellabs admits, *Optical Networks* "clearly discloses at least one embodiment of an optical demultiplexer *that employs waveguides*, not optical fibers, for coupling optical signals to and from the optical demultiplexer." (Tellabs's Resp. 25 (emphasis added).)

The requirement that the demultiplexer include a single input on a waveguide is further supported by the *Fiber Optics Standard Dictionary* (1997), which was cited by the PTO during the reexamination of the '772 Patent. (Tellabs's Resp. 19 n.86.) The *Fiber Optics Standard Dictionary* defines "demultiplex" as "[t]he inverse of multiplex, i.e., to separate two or more signals, such as optical pulses, that previously were combined, i.e., were multiplexed, by a compatible multiplexer and transmitted *over a single channel, such as a fiber optical channel*, for subsequent demultiplexing." *Fiber Optics Standard Dictionary* 209 (3d ed. 1997) (emphasis added) (attached as Ex. 17 to Tellabs's Resp.). A "demultiplexer," the *Fiber Optics Standard Dictionary* further explains, is "[a] device that performs demultiplexing." *Id.*

Based on this evidence, the court disagrees with Tellabs's position that "the means for coupling optical signals to and from an optical demultiplexer is separate and distinct from the optical demultiplexer itself." (Tellabs's Resp. 27.) Instead, the above evidence demonstrates that the physical structure of the input is an integral part of an "optical demultiplexer" as that term is commonly understood to a person of ordinary skill in the art.

The court notes that Tellabs has presented certain extrinsic evidence suggesting that the optical signal could be input into the optical demultiplexer through the air rather than through a single waveguide. (*See* Case No. 09-4530, Dkt. No. 261 ("Tellabs's '772 Patent Presentation") 48.) Based on the disclosures of the '772 Patent coupled with the additional intrinsic evidence and dictionary definitions addressed above by the court, the court disagrees that one of ordinary skill in the art of the '772 Patent would understand that an ordinary optical demultiplexer would have such an input. The evidence discussed above repeatedly refers to an input over a physical medium, with that medium being either broadly described as a waveguide or more specifically referred to as a single optical fiber or a fiber optical channel. Thus, although inputting the optical signal into optical demultiplexer via air may be possible, one of ordinary skill in the art of the '772 Patent would not understand that the "optical demultiplexer" for the WDM system disclosed in the '772 Patent could receive such an input.

The parties have presented additional extrinsic evidence in support of their respective positions as to whether an optical demultiplexer must receive its optical signal input on a single input waveguide, but the court finds that it need not consider this evidence to ascertain the meaning of this term to a person of ordinary skill. From the intrinsic evidence and the proffered dictionary definitions, the court finds that "optical demultiplexer," as that term appears in the '772 Patent, "receives a single optical waveguide carrying an optical signal," as proposed by Fujitsu. The court has considered Tellabs's additional arguments in support of its proposed construction and finds that they also do not support a broader interpretation of "optical demultiplexer."

Lastly, the court agrees with Fujitsu that the "optical demultiplexer" is not used to perform the function of a "filter," which discards at least one of the constituent wavelengths input to the filter. As the specification explains, "an optical signal having N optical wavelengths . . [is] multiplexed/demultiplexed by a multiplexer/demultiplexer 6, which outputs demultiplexed wavelengths λ1-λN on individual optical fibers." '772 Patent, col.2 ll.42-46. In other words, all the wavelengths input into the demultiplexer are subsequently output after being demultiplexed. Thus, for clarity and to distinguish the optical demultiplexer from a filter, the court construes the claim term "optical demultiplexer" to mean:

> A device that receives N optical wavelengths multiplexed together as an optical signal on a single optical waveguide and outputs the N wavelength channels on individual optical waveguides, where the device outputs each of the N wavelengths as at least one of the following: (a) individual wavelengths, (b) bands of wavelengths or (c) a combination of bands and individual wavelengths.[6]

2. "optical line interface" (claims 2, 6-13 &17-24)

The term "optical line interface" appears in claims 2, 6-13, and 17-24 of the '772 Patent. In its preliminary construction, this court construed the claim term "optical line interface" to mean "an interface that can carry a plurality of wavelengths multiplexed together as an optical signal." (Prelim. Constr. Op. 13.) Tellabs agrees with the court's preliminary construction. Fujitsu, however, argues that the court should revise this construction to read: "An interface adapted for transmitting/receiving wavelength division multiplexed optical communication signals on a single optical fiber (where 'transmitting/receiving' means 'transmitting and

[6] In its Opening Brief, Fujitsu noted that should the court modify its preliminary construction of "optical demultiplexer," the court correspondingly should modify its preliminary construction of "optical multiplexer," which appears in claims 14-15 of the '772 Patent. Because Tellabs cancelled those claims during reexamination, the court has not construed "optical multiplexer" in this opinion.

receiving')." For the following reasons, the court adopts Fujitsu's proposed construction and construes "optical line interface" in claims 2, 6-13, and 17-24 of the '772 Patent to mean "an interface adapted for transmitting/receiving wavelength division multiplexed optical communication signals on a single optical fiber (where 'transmitting/receiving' means 'transmitting and receiving')." The parties agree that an "optical line interface" can send or receive a plurality of wavelengths multiplexed together. The dispute centers on (1) whether the "optical line interface" must be bidirectional and (2) whether the signals must travel over a single optical fiber.

First, the term "optical line interface" does not appear to have a customary meaning to a person of ordinary skill. Tellabs admits that the term "optical line interface" is an "uncommon term" (Case No. 09-4530, Dkt. No. 261, Tellabs's '772 Patent Presentation 117; 12/3/10 *Markman* Tr. Vol. 4, 433:6-10), and the inventor testimony presented by Fujitsu further confirms that this term lacks an ordinary meaning. Specifically, Dr. Ramaswami acknowledged that "optical line interface" was not "commonly used" (Ramaswami Dep. 149:15-21 (attached as Ex. B-5 to Fujitsu's Op. Br.)), and Dr. Gerstel similarly stated that the term is "somewhat generic" (Gerstel Dep. 97:3-4 (attached as Ex. B-2 to Fujitsu's Op. Br.)). "Without a customary meaning of a term within the art, the specification usually supplies the best context for deciphering claim meaning." *Honeywell Int'l Inc. v. Universal Avionics Sys. Corp.*, 488 F.3d 982, 991 (Fed. Cir. 2007).

Here, the specification repeatedly and uniformly discloses that the "optical line interface" is bidirectional and transmits the signals over a single optical fiber. The Detailed Description of the Invention section instructs that

> FIG. 1 is a block diagram of an optical line terminal (OLT) 2 which is the basic element of the present embodiment. The OLT 2 has *an input/output line interface* 4 which is connected to an external fiber facility and *transmits/receives* an optical signal having N optical wavelengths, for example 32 wavelengths, *on a single optical fiber* which is multiplexed/demultiplexed by a multiplexer/demultiplexer 6, which outputs demultiplexed wavelengths λ1- λN on individual optical fibers.

'772 Patent, col.2 ll.39-46 (emphasis added). Figure 1 confirms that the phase "transmits/receives" in the above excerpt refers to both transmitting *and* receiving. In Figure 1, signals are traveling both left to right and right to left and either enter or exit the multiplexer/demultiplexer 6 through the input/output line interface 4.

Similarly, in Figure 3, "[t]he OLT terminal 200 has input/output line interface 202 which is connected to an external fiber facility and receives on a single optical fiber N . . . wavelengths which are demultiplexed by a multiplexer/demultiplexer 204." *Id.* at col.4 ll.16-20. Finally, in describing Figure 4 of the '772 Patent, the specification states:

> FIG. 4 is a simplified schematic diagram representative of the OLT 2 shown in FIG. 1 or the OLT 200 of FIG. 3. . . . The OLT 300 interfaces and operates in a bidirectional manner as discussed in detail with respect to FIGS. 1 and 3. The line interface 302 is adapted for wavelength division multiplexed (WDM) optical communication signals of the highest relative order . . . corresponding to the N optical wavelengths on a single optical fiber which are applied to input/output line interfaces 4 and 202 of OLT 2 (FIG. 1) and OLT 200 (FIG. 3), respectively.

Id. at col.4 ll.53-54.

The '772 Patent's embodiments disclosed in the specification consistently require that the "optical line interface" is a single, bidirectional optical fiber, and Tellabs has not identified any evidence in the specification suggesting that "optical line interface" could have a broader meaning to a person of ordinary skill.

Tellabs, however, argues that the language of the claims does not support limiting requiring that the "optical line interface" be bidirectional.[7] The court disagrees. Claim 6 recites, *inter alia*, "a first optical line interface operable to receive from a WDM network an optical signal" and "a second optical line interface operable to transmit to a WDM network an optical signal." *Id.* at col.7 ll.39-40, 51-52. According to Tellabs, because claim 6 only requires that the optical line interface "receive" or "transmit" the optical signal, the optical line interface need not be bidirectional. This interpretation is not persuasive. Instead, the court agrees with Fujitsu that claim 6 refers to a first optical line interface that receives a signal from a first WDM network and a second optical line interface that transmits the signal to a second, different WDM network. Moreover, to the extent that claim 6 could be interpreted as implying that the "optical line interface" is unidirectional, that interpretation is inconsistent with the teachings of the specification.

In *Retractable Technologies, Inc. v. Becton*, Case No. 2010-1402, 2011 WL 2652448 (Fed. Cir. July 8, 2011), the Federal Circuit held that the district court erred in broadly construing the claim term "body" as not being limited to a "one-piece structure." The patent in *Retractable Technologies* recited a "body" in an independent claim and a "one-piece body" in a dependent claim, but none of the claims "expressly recite[d] a body that contains multiple pieces." *Id.* at *7. As a result, the court concluded that "while the claims [could] be read to imply that a 'body' [was] not limited to a one-piece structure, that implication [was] not a strong

[7] In its briefing and during the *Markman* hearing, Tellabs relied heavily on the doctrine of claim differentiation, arguing that the presence of the term "bidirectional optical line interface" in claims 14-16 demonstrated that the "optical line interface" need not be bidirectional. Because Tellabs cancelled claims 14-16 during reexamination of the '772 Patents, this argument now lacks merit.

one." *Id.* Emphasizing that the "[c]laim language must always be read in view of the written description," the court ultimately found that the specification limited the claimed "body" to a one-piece structure. *Id.* at 7-8.

Similarly here, the specification uniformly discloses that the optical line interface both transmits and receives signals bidirectionally on a single fiber; it provides no examples of a unidirectional optical line interface. Additionally, the '681 Patent's claims, like the claims in *Retractable Technologies*, do not "expressly recite" that the optical line interface need only transmit or receive signals unidirectionally. The court, therefore, disagrees with Tellabs that the language of claim 6 supports broadening the optical line interface beyond the disclosures of the specification.

Nor does Tellabs's cited excerpt from *Optical Networks* (1st ed. 1998) suggest that one of ordinary skill would understand that the optical line interface disclosed in the '772 Patent could be unidirectional and on multiple fibers. Tellabs relies on the following statement from that text:

> A unidirectional WDM system uses two fibers, one for each direction of traffic . . . . A bidirectional system, on the other hand, requires only one fiber, and typically uses half the wavelengths for transmitting data in one direction and the other half for transmitting data in the opposite direction on the same fiber. Both types of systems are being developed and have their pros and cons.

Optical Networks 505 (1st ed. 1998) (attached as Ex. 13 to Tellabs's Resp.). This excerpt, however, does not refer to an "optical line interfaces" and thus provides little guidance as to how one of ordinary skill in the art would understand that claim term. Moreover, the '772 Patent's specification uniformly discloses a bidirectional–not a unidirectional–system. That a person of

ordinary skill would have been aware of unidirectional WDM systems does not change the express teachings of the specification or support broadening the claims. Tellabs is not entitled to a construction of "optical line interface" that is "divorced from what the specification conveys is the invention." *Retractable Techs.*, 2011 WL 2652448, at *8. Consequently, for the reasons explained above, the court construes "optical line interface" to mean "an interface adapted for transmitting/receiving wavelength division multiplexed optical communication signals on a single optical fiber (where 'transmitting/receiving' means 'transmitting and receiving')."

3. "optical demultiplexer through which the first optical line interface is not optically coupled to the first transponder" (claims 2 & 6-13) and "optical demultiplexer through which the first optical path does not extend" (claims 17-24)

The claim term "optical demultiplexer through which the first optical line interface is not optically coupled to the first transponder" appears in claims 2 and 6-13 of the '772 Patent. The claim term "optical demultiplexer through which the first optical path does not extend" appears in claims 17-24 of the '772 Patent. Because these terms are so closely related, the parties refer to these phrases collectively as "optical demultiplexer through which . . . ." The court, therefore, addresses them together.

In its preliminary construction, this court construed the claim term "optical demultiplexer through which the first optical line interface is not optically coupled to the first transponder" to mean "the first optical line interface does not send optical information to the first transponder through the optical demultiplexer. Alternatively, the first optical line interface does

not receive optical information from the first transponder through the optical demultiplexer." (Preliminary Constr. Op. 12.) The court similarly construed the claim term "optical demultiplexer through which the first optical path does not extend" in claims 17-24 of the '772 Patent to mean "the first optical path does not pass through the optical demultiplexer." (*Id.* at 26.)

Fujitsu argues that the court should revise its preliminary constructions of these terms because the claims of the '772 Patent are expressly directed to a two-stage optical demultiplexer arrangement. (Fujitsu's Op. Br. 47.) Fujitsu also contends that Tellabs's statements during the prosecution of the '772 Patent amounted to a disavowal of a single-stage demultiplexer system, thereby limiting the terms to two-stage optical demultiplexer arrangements. (*Id.* at 53-55.) Consequently, Fujitsu contends that the proper construction of these terms is "optical demultiplexer that receives a band of a predetermined number of wavelengths *output from another demultiplexer*, separates the band into its individual wavelengths and does not provide any of those individual wavelengths to the first transponder." *Id.* at 47 (emphasis added). Tellabs, on the other hand, maintains that the claim language of the '772 Patent does not require a second-stage demultiplexer and that the court's preliminary construction of these terms was correct. (Tellabs's Resp. 28.) The central issue regarding these claim terms, therefore, is whether the "optical demultiplexer through which . . ." must be a demultiplexer that receives a band of wavelengths from another demultiplexer, ie., whether the claims are limited to a two-stage demultiplexing arrangement. After reviewing the parties' respective arguments and the relevant evidence, the court agrees with Tellabs that the phrase "optical demultiplexer through which . . ." does not require such a two-stage demultiplexing arrangement.

The claim terms "optical demultiplexer through which the first optical line interface is not optically coupled to the first transponder" and "optical demultiplexer through which the first optical path does not extend" were added by amendment during prosecution in the PTO in September 2007. The claims alone do not indicate that the "optical demultiplexer through which . . ." phrases require a two-stage demultiplexer arrangement. Claim 1, for example, only refers to one optical demultiplexer, the "optical multiplexer through which the first optical line interface is not optically coupled to the first transponder." That claim similarly does not reference both first- and second-stage demultiplexing. When the claims are intended to require the inclusion of multiple devices, however, the claims clearly recite such a limitation. Claim 1, for example, refers to a first and second optical line interface, a first and second local port, and a first and second transponder. A similar reference to a first and second optical demultiplexer is noticeably absent from the claim language, thereby suggesting that the "optical demultiplexer through which . . ." phrases do not require the presence of both a first and second optical demultiplexer.

Turning to the specification, Fujitsu argues that the only support for the "optical demultiplexer through which . . ." claim limitations is the two-stage demultiplexer arrangement disclosed in Figure 3 of the '772 Patent.

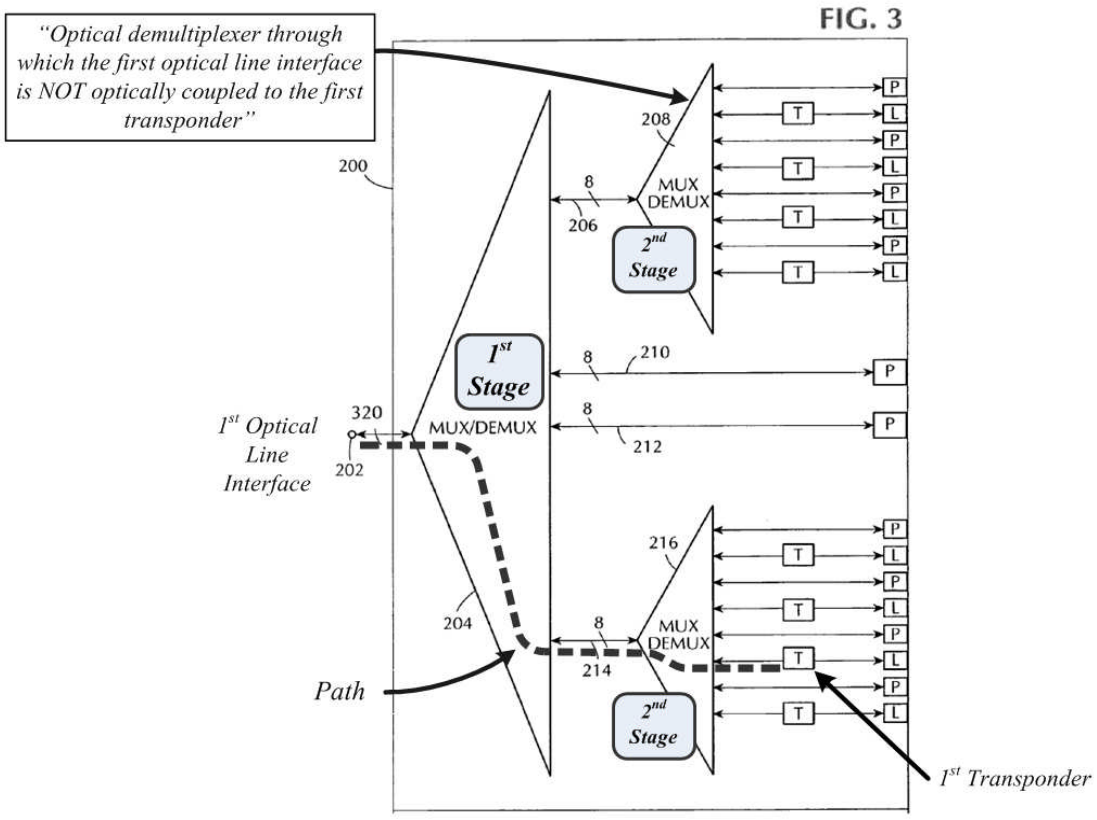

Figure 3 depicts a first-stage demultiplexer (204) that demultiplexes the input signal from line 320 into smaller parts (e.g. bands of wavelengths) and outputs those smaller parts on lines 206 and 214. Lines 206 and 214 are inputs for the second-stage demultiplexers (208, 216). Mapping a path between the first optical line interface (202) and the first transponder (here, the T connected to the lower second-stage demultiplexer (214)), demultiplexer (208) is the only demultiplexer "through which the first optical line interface is not optically coupled to the first transponder." Although Tellabs has not identified any additional embodiments expressly disclosed in the specification supporting the "optical demultiplexer through which . . ." limitation, the Federal Circuit has repeatedly cautioned that "[g]enerally, a claim is not limited to the embodiments described in the specification unless the patentee has demonstrated a 'clear

intention' to limit the claim's scope with 'words or expressions of manifest exclusion or restriction.'" *i4i Ltd. P'ship v. Microsoft Corp.*, 598 F.3d 831, 843 (Fed. Cir. 2010) (quoting *Liebel-Flarsheim*, 358 F.3d at 906).

Here, '772 Patent's specification uses "permissive language" when discussing two-stage demultiplexing and, accordingly, "does not clearly disclaim systems lacking" a second demultiplexer. *See id.* at 844 ("The specification's permissive language, "could be edited," "can be created," and "ability to work," does not clearly disclaim systems lacking these benefits."). For example, the specification instructs that "[i]t is yet another aspect of the invention to utilize optical line terminals having a multiplexer/demultiplexer including *one or more stages*," '772 Patent, col.1 ll.52-54 (emphasis added); "[t]he optical multiplexer/demultiplexer *may* include one or more stages," *id.* at col.2 ll.1-2 (emphasis added); and "at least one of the four bands of wavelengths *can* be demultiplexed by a second multiplexer/demultiplexer," *id.* at col.4 ll.1-3 (emphasis added). "In reviewing the intrinsic record to construe the claims, [the court] strive[s] to capture the scope of the actual invention, *rather than strictly limit the scope of the claims to the disclosed embodiments* or allow the claim language to become divorced from what the specification conveys is the invention." *Retractable Techs., Inc. v. Becton*, Case No. 2010-1402, 2011 WL 2652448, at *8 (Fed. Cir. July 8, 2011) (emphasis added). Here, neither the claims nor the specification inform a person of ordinary skill that a two-stage demultiplexing arrangement is required.

The court is similarly unpersuaded by Fujitsu's argument that Tellabs disclaimed single-stage demultiplexing during the prosecution of the '772 Patent. "[F]or prosecution disclaimer to attach, [Federal Circuit] precedent requires that the alleged disavowing actions or statements

made during prosecution be both clear and unmistakable." *Lazare Kaplan Int'l, Inc. v. Photoscribe Techs., Inc.*, 628 F.3d 1359, 1370 (Fed. Cir. 2010) (first alteration in original) (quoting *Omega Eng'g, Inc. v. Raytek Corp.*, 334 F.3d 1314, 1325-26 (Fed. Cir. 2003)). Here, the prosecution history does not contain such a clear and unmistakable disavowal of claim scope.

In Tellabs's September 10, 2007 Amendment, Tellabs identified for the PTO examiner the support in the specification for its amendment to claim 1, which added the phrase "an optical demultiplexer through which the first optical line interface is not optically coupled to the first transponder." (Sept. 10, 2007 Am. at J.A. 187.) Specifically, Tellabs stated that "[e]lement 208 in Fig. 3 includes a demultiplexer through which the first line interface 202 is not optically coupled to the first transponder 'T.'" (*Id.* at J.A. 200.) Figure 3 discloses the two-stage optical demultiplexing arrangement discussed above. Tellabs further explained, however, that "the foregoing embodiment has been referred to for purposes of illustration only, and the claimed invention should not be construed as being limited to that embodiment only." (*Id.*) The court agrees with Tellabs that these statements to the examiner do not amount to a disavowal of claim scope.

In *SunRace Roots Enterprise Co. v. SRAM Corp.*, 336 F.3d 1298 (Fed. Cir. 2003), the Federal Circuit distinguished between arguments made to the examiner to define a term or distinguish the claimed invention from the prior art with those arguments intended to demonstrate that the claims comported with the written description requirement, and concluded that the latter type of statements did not constitute "the requisite disclaimer":

> SRAM pointed to the discussion of the cam means of the preferred embodiment, however, not to define the term shift actuator nor to distinguish the shift actuators

> in the claims from prior art shift actuators that lacked cams. Rather, SRAM did so to show that the written description requirement was satisfied and that no new matter was being introduced with the amendment that added claims 27 and 28.

Id. at 1307. Applying the reasoning of *SunRace* to the circumstances of this case, the court finds that the statements identifying support in the specification for the "optical demultiplexer through which . . ." term do not qualify as a clear and unmistakable disavowal of claim scope.

Fujitsu additionally argues that Tellabs disclaimed single-stage demultiplexing based on Tellabs's response to the examiner's 35 U.S.C. § 102(b) rejection, which rejected claim 1 based on the prior art Brackett reference. (Office Action at J.A. 174-75.) In response to the rejection, Tellabs amended claim 1 to add, *inter alia*, the phrase "optical demultiplexer through which the first optical line interface is not optically coupled to the first transponder." (Sept. 10, 2007 Am. at J.A. 199.) In distinguishing claim 1 from Brackett, Tellabs explained to the examiner that "[n]othing has been found, or pointed out, in Bracket et al., that would teach or suggest an optical demultiplexer through which a first optical line interface is not optically coupled to the first transponder . . ." (*Id.* at J.A. 202.) Because the phrase "optical demultiplexer through which . . ." does not clearly require a second demultiplexer, the court disagrees with Fujitsu that Tellabs, by making this statement distinguishing the prior art based on the presence of an "optical demultiplexer through which a first optical line interface is not optically coupled to the first transponder," manifested its intention to disavow all systems lacking a second demultiplexer. Consequently, the prosecution history does not support Fujitsu's proposed construction.

The court has also reviewed the inventor testimony cited by Fujitsu and finds that this evidence does not warrant limiting the "optical demultiplexer through which . . ." to a second-

stage demultiplexer. In the cited testimony (*see* Fujitsu's Op. Br. 59-60), Dr. Ramaswami does not clearly limit claim 1 to two-stage demultiplexing. Instead, he simply acknowledges the specification's disclosure of two-stage demultiplexing and discusses the benefits of such an arrangement. (*See id.*) Moreover, as the Federal Circuit has cautioned, "inventor testimony as to the inventor's subjective intent is irrelevant to the issue of claim construction." *Howmedica Osteonics Corp. v. Wright Med. Tech., Inc.*, 540 F.3d 1337, 1347 (Fed. Cir. 2008); *see also Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 985 (Fed. Cir.1995) ("While presumably the inventor has approved any changes to the claim scope that have occurred via amendment during the prosecution process, it is not unusual for there to be a significant difference between what an inventor thinks his patented invention is and what the ultimate scope of the claims is after allowance by the PTO.").

The court has considered Fujitsu's remaining arguments for limiting the "optical demultiplexer through which . . ." phrases to a two-stage optical demultiplexer arrangement and finds they similarly lack merit. Accordingly, the court maintains its preliminary constructions of the "optical demultiplexer through which . . ." claim terms. "Optical demultiplexer through which the first optical line interface is not optically coupled to the first transponder" in claims 2 and 6-13 means "the first optical line interface does not send optical information to the first transponder through the optical demultiplexer. Alternatively, the first optical line interface does not receive optical information from the first transponder through the optical demultiplexer." "Optical demultiplexer through which the first optical path does not extend" in claims 17-24 means "the first optical path does not pass through the optical demultiplexer."

4. "transponder" (claims 2, 6-13 & 17-24)

The term "transponder" appears in claims 2, 6-13, and 17-24 of the '772 Patent. In its preliminary constructions, this court stated that it was unable to construe the term "transponder" without the benefit of extrinsic evidence (*see* Prelim. Constr. Op. 39), which the parties have now presented to the court.

Fujitsu contends that the term "transponder" means "a device that enables the receipt of an incoming signal from a client equipment and/or that enables the transmission of a signal to the client equipment." (Case No. 09-4530, Dkt. No. 231-1 at 17.) Tellabs, on the other hand, argues that the proper construction is "an electro-optical conversion (OEO) device adapted to: (a) receive a client-side optical signal and in response output a network-side optical signal, or (b) receive a network-side optical signal and in response output a client-side optical signal." (*Id.*) The parties' dispute as to this term centers around whether the "transponder" is a device with only an optical signal input and an optical signal output (i.e., O-E-O transponders) or whether the "transponder" is not so limited and could include, for example, an optical signal input and an electrical signal output or vice versa (i.e., O-E transponders). As explained below, the court adopts Tellabs's proposed construction and construes "transponder" to mean "an electro-optical conversion (OEO) device adapted to: (a) receive a client-side optical signal and in response output a network-side optical signal, or (b) receive a network-side optical signal and in response output a client-side optical signal."

First, the '772 Patent's claims explicitly require *optical* coupling to and from the claimed transponder. For example, claim 1 claims, *inter alia*, "a first optical line interface *optically coupled* to a first transponder; a first local port *optically coupled* to the first transponder;" and "a second local port *optically coupled* to a second transponder." '772 Patent,

col.7 ll.4-6, 11-12. The plain language of the claims, therefore, supports Tellabs's position that the "transponder" is an O-E-O device, with an optical input and an optical output.

Similarly, the specification discloses that the transponder receives and transmits optical signals, which are represented by wavelengths or "λ." For example, the '772 Patent instructs that "λ1 is provided to a transponder 18 which transmits λ1 to a client apparatus 20 via a local port 19." *Id.* at col.2 l.66-col.3 l.1.

Fujitsu's reliance on *Optical Networks* (2d. Ed. 2002) to support its broad construction of transponders is misplaced. Fujitsu relies on the following description of "transponders" in *Optical Networks* as evidence that one of ordinary skill would not limit a transponder to an O-E-O device: "A transponder adapts the signal coming in from a client of the optical network into a signal suitable for use inside the optical network. Likewise, in the reverse direction, it adapts the signal from the optical network into a signal suitable for the client." *Optical Networks* 406 (2d ed. 2002) (attached as Ex. B-13 to Fujitsu's Op. Br). That excerpt from *Optical Networks*, however, also references Figure 7.2, which Fujitsu did not include in its attached exhibit (*see* Ex. B-13 to Fujitsu's Op. Br). Figure 7.2 depicts a wavelength inputting the transponder as "Non ITU λ"[8] and then being output as "ITU λ." As Fujitsu does not dispute, wavelengths are directed to optical, not electrical, signals. (Fujitsu's Op. Br. 15.) Figure 7.2, therefore, demonstrates that the transponder both inputs and outputs an optical signal. *Optical Networks* further explains that "the adaptation [by the transponder] is typically done through an optical-to-electrical-to optical

[8] "ITU" refers to the International Telecommunications Union, which sets certain communication standards. *See Optical Networks* 407 (2d ed. 2002).

(O/E/O) conversion," *Optical Networks* 407 (2d ed. 2002), which is consistent with Tellabs's proposed construction.

A contemporaneous patent issued to the '772 Patent's inventors also indicates that one of ordinary skill would understand that "transponder," as used in the '772 Patent, is an O-E-O device. U.S. Patent No. 7,181,138 ("'138 Patent"), which is titled "Optical Network Connection Test Apparatus and Methods" and lists both Dr. Gerstel and Dr. Ramaswami as inventors, explains that transponders in WDM systems generally receive and transmit wavelengths:

> WDM systems typically interface between a client equipment and an optical network through *a transponder*, which either converts a signal received from attached client equipment at *a non-compatible wavelength into a wavelength* that is suitable for use within the network, or converts a signal received from the network *at a non-compatible wavelength into a wavelength* that is suitable for use by attached client equipment.

'138 Patent, col.2 ll.26-33 (emphasis added).

Tellabs also presented inventor deposition testimony supporting its position that transponders, to one of ordinary skill in the art of the '772 Patent, require an optical input and optical output. For example, Dr. Ramaswami testified: "[T]he way I would define [it], a transponder has only optical interfaces on both sides, optical interfaces facing the client, optical interfaces facing . . . the WDM side as well." (Ramaswami Dep. 144:8-14 (attached as Ex. 18 to Tellabs's Resp.).) Similarly, Dr. Gerstel testified that "a transponder will in many cases convert one wavelength to another wavelength, but that does not have to be the only option. It could, for example, take the same wavelength and regenerate it." (Gerstel Dep. 157:17-20 (attached as Ex. 27 to Tellabs's Resp.). Such testimony is relevant for understanding the meaning of the term "transponder" in the '772 Patent to a person of ordinary skill. *Howmedica Osteonics Corp. v.*

Wright Med. Tech., Inc., 540 F.3d 1337, 1347 n.5 (Fed. Cir. 2008) ("The testimony of an inventor . . . may be pertinent as a form of expert testimony, for example, as to understanding the established meaning of particular terms in the relevant art.").

Fujitsu has also presented evidence of non-O-E-O transponders, such as the Agere/Lucent transponder (*see* Fujitsu's Op. Br. 17), and Tellabs does not dispute that such transponders were known to a person of ordinary skill. The court, however, agrees with Tellabs that although such transponders were known, those transponders are not consistent with the plain language of the claims nor do they comport with the teachings of the specification or the other intrinsic evidence. The court has considered and finds unpersuasive Fujitsu's remaining arguments for a broad construction of the term "transponder" that includes non-O-E-O conversion devices. Accordingly, the court construes the term "transponder" in the '772 Patent to mean "an electro-optical conversion (OEO) device adapted to: (a) receive a client-side optical signal and in response output a network-side optical signal, or (b) receive a network-side optical signal and in response output a client-side optical signal."

5. "local port" (claim 2)

The term "local port" appears in claim 2 of the '772 Patent. In its preliminary construction, this court construed the claim term "local port" to mean "a point of physical interface." (Prelim. Constr. Op. 16-17.) The parties agree that a "local port" can be a point of physical interface, but disagree as to whether a "local port" must be located on the client side of a transponder. Although Tellabs initially agreed that a "local port" was "a point of physical

interface" (*see* Case No. 08-3379, Dkt. No. 271 ("Tellabs's Supp. '772 Patent Tutorial") 4), Tellabs now argues that this court's preliminary construction does not give proper meaning to the word "local." (Tellabs's Resp. 6.) Instead, Tellabs proposes that the court construe "local port" to mean "a point of physical interface on the client-side of the transponder." (*Id.*) Fujitsu, however, argues that Tellabs's construction of "local port" is not supported by the claims or the specification but rather is another attempt to require that the claimed "transponder" only and always perform the O-E-O adaptation. (Fujitsu's Op. Br. 24.) According to Fujitsu, this court's preliminary construction is correct. (*Id.* at 23.) For the reasons explained below, the court maintains its preliminary construction of "local port" as "a point of physical interface."

The claims place no limitations on the location of the "local port" other than requiring that the local port be "optically coupled" to a transponder. Claim 1 of the '772 Patent recites "a first local port optically coupled to the first transponder" and a "second local port optically coupled to a second transponder." '772 Patent, col.7 ll.6, 11-12. The specification similarly does not support limiting the local port's location to the client-side of the transponder. Although Figures 1 and 3 of the '772 Patent do depict such a configuration of the local port, the specification also discloses local ports that are not located on the client side of the transponder. Figure 8, for example, illustrates a local port connected to another local port. In describing Figure 8, the specification explains:

> Wavelengths 9, 10, 11 and 12 (channels 9, 10, 11 and 12) can be separated into individual channels that are connected between local ports of the respective OLTs. For example, *channel 9 is directly connected between a local port of OLT 600 and a local port of OLT 602 via optical fiber 610, and channel 10 is directly connected between a local port of OLT 600 and a local port of OLT 606 via optical fiber 612.*

Id. at col.6 ll.37-44 (emphasis added). Neither Figure 8 nor the specification's description of that figure mention a transponder or client equipment. Consequently, a person of ordinary skill in the art, having reviewed the '772 Patent's specification, would not understand the term "local port," as being limited to a port that is on the client side of the transponder.

The parties have not directed the court to anything in the prosecution history supporting their proposed constructions, and the court finds that it need not resort to extrinsic evidence to properly construe this claim term. The intrinsic evidence unambiguously demonstrates that a local port should not be limited to "a point of physical interface *on the client-side of the transponder*," as Tellabs contends. Instead, the court continues to construe the term "local port" to mean "a point of physical interface," as set forth in the court's preliminary claim construction.

6. "modular card" (claims 11-13, 22 & 24)

The term "modular card" appears in claims 11-13, 22, and 24 of the '772 Patent. In its preliminary construction, this court was unable to construe the claim term "modular card" without the benefit of extrinsic evidence. (Prelim. Constr. Op. 39.) Fujitsu contends that the term "modular card" is indefinite. (Fujitsu's Op. Br. 63.) Tellabs, however, maintains that "modular card" is definite and should be construed to mean "a card that can be added to or replaced in a slot of the system." (Tellabs's Resp. 66.) For the following reasons, this court adopts Tellabs's proposed construction of "modular card."

Fujitsu contends that the claim term "modular card" did not have a "single commonly understood meaning to persons of skill in the art" at the time of the invention, and the '772

Patent does not describe the meaning of "modular card." (Fujitsu's Op. Br. 64.) As a result, Fujitsu contends, "modular card" is "hopelessly indefinite" and cannot be reasonably construed. (*Id.* at 63.) The court disagrees.

Under 35 U.S.C. § 112 ¶ 2, a patent's claims must "particularly point[] out and distinctly claim[] the subject matter which the applicant regards as his invention." *Id.* "A claim is considered indefinite if it does not reasonably apprise those skilled in the art of its scope." *Microprocessor Enhancement Corp. v. Tex. Instruments Inc.*, 520 F.3d 1367, 1374 (quoting *IPXL Holdings, L.L.C. v. Amazon.com, Inc.*, 430 F.3d 1377, 1383-84 (Fed. Cir. 2005)). Because of the presumption of a claim's validity, "a claim is indefinite only if the claim is insolubly ambiguous, and no narrowing construction can properly be adopted." *Id.* (quoting *Honeywell Int'l, Inc. v. Int'l Trade Comm'n*, 341 F.3d 1332, 1338-39 (Fed. Cir. 2003)). "[P]roof of indefiniteness," therefore, "must meet an exacting standard," and the accused infringer bears the burden of "demonstrat[ing] by clear and convincing evidence that one of ordinary skill in the relevant art could not discern the boundaries of the claim based on the claim language, the specification, the prosecution history, and the knowledge in the relevant art." *Wellman, Inc. v. Eastman Chem. Co.*, 642 F.3d 1355, 1366 (Fed. Cir. 2011) (quoting *Haemonetics Corp. v. Baxter Healthcare Corp.*, 607 F.3d 776, 783 (Fed. Cir. 2010)). Thus, "[i]f the meaning of the claim is discernible, even though the task may be formidable and the conclusion may be one over which reasonable persons will disagree, . . . the claim [is] sufficiently clear to avoid invalidity on indefiniteness grounds." *Source Search Techs., L.L.C. v. Lending Tree, L.L.C.*, 588 F.3d 1063, 1076 (Fed. Cir. 2009) (quoting *Exxon Res. & Eng'g Co. v. United States*, 265 F.3d 1371, 1375 (Fed. Cir. 2001)). "A determination of claim indefiniteness is a legal conclusion that is

drawn from the court's performance of its duty as a construer of patent claims." *Telcordia Techs., Inc. v. Cisco Sys., Inc.*, 612 F.3d 1365, 1376 (Fed. Cir. 2010) (citation omitted). The court finds that Fujitsu has failed to meet this "exacting standard" in demonstrating that the claim term "modular card" is insolubly ambiguous.

Claim 12, which recites a first and second modular card, illustrates the basis for Fujitsu's indefiniteness position. Claim 12 claims, in pertinent part, "[t]he optical add/drop multiplexing system of claim 6, wherein the first transponder resides on a first modular card of the system, and wherein the optical demultiplexer resides on a second modular card of the system that is not the first modular card." '772 Patent, col.8 ll.37. According to Fujitsu, the boundaries of the claims reciting the "modular card" term are indefinite because a person of ordinary skill would not know what specific components are on the modular card and also could not discern whether a device qualifies as a single modular card or multiple modular cards. The court is not persuaded by these arguments.

The specification discloses the various functions that can be performed on the modular card, including multiplexing and demultiplexing:

> The OLT terminal 200 has an input/output line interface 202 which is connected to an external fiber facility and receives on a signal optical fiber N, for example 32, wavelengths which are demultiplexed by a multiplexer/demultiplexer 204, which is situated on a first modular card, into M, for example 4, bands of 8 wavelengths each. The first band 206 ($\lambda 1$-$\lambda 8$) is demultiplexed into its 8 individual wavelengths by a multiplexer/demultiplexer 208, which is situated on a second modular card, with each such wavelength being provided to a pass-through port (P) or a local port (L) via transponder (T). Each of the pass-through ports (P) is situated on a different modular card, and each of the transponder (T) and its associated local port (P) are situated on yet another modular card.

Id. at col.4 ll.16-29. A person of ordinary skill would understand what sub-components would need to be located on modular cards to perform these various functions and would also understand the boundaries of the modular card. As long as the meaning of the claim is discernible, that fact that reasonable people may disagree as the scope of the "modular card" does not render the claims indefinite. The court therefore disagrees with Fujitsu that the term "modular card" is indefinite because the patent does not list all the sub-components on a modular card or identify the precise size of the modular card. To the contrary, as the Federal Circuit has recognized, "an inventor need not explain every detail because a patent is read by those of skill in the art." *See Wellman*, 642 F.3d at 1367.

Fujitsu's argument that the term "modular card" is indefinite because the modular card is not labeled on any of the specification's figures is also unavailing. The specification discloses the role of the modular card and, as discussed below, additional intrinsic and extrinsic evidence demonstrates that a person of ordinary skill in the art would understand the meaning of this claim term. That the modular card is not labeled on any of the disclosed figures does not render the claim term indefinite, s*ee Wellman*, 642 F.3d at 1367, and Fujitsu has not cited any Federal Circuit authority suggesting otherwise.

Intrinsic and extrinsic evidence further supports Tellabs's contention that the term "modular card" is not indefinite to a person of ordinary skill. First, *Optical Networks* discloses the use of cards in slots to create modular systems in optical networking equipment, providing additional evidence that a person of ordinary skill was familiar with a "modular card" and would understand the scope of the claims reciting that term. For example, in discussing equipment management for optical networks, *Optical Networks* explains that "[a]mong the considerations

are that we should be able to add to existing equipment in a *modular* fashion." *Optical Networks* 427 (1st ed. 1998) (emphasis added) (attached as Ex. 13 to Tellabs's Resp.). Additionally, *Optical Networks* instructs that "[w]e may also desire flexibility in associating specific port cards in the equipment with specific wavelengths. For example, it is better to a have a system where we can choose the wavelength transmitted out of a port card independently of what *slot* it is located in." *Id.* (emphasis added).

Second, patents from the relevant time period cited by Tellabs similarly demonstrate that the use of modular cards was common in the art at the time of the invention. For example, U.S. Patent No. 5,574,722 ("'722 Patent") issued on November 12, 1996 and is titled "Protocol Independent Switch." The '722 Patent relates to data communication networks and discusses the known use of "modular cards" in such systems. Specifically, the '722 Patent explains that prior art networks "allow[ed] for insertion of multiple modular cards where, for example, a first modular card may have a plurality of ports for support of CSMA protocol DTEs and a second modular card may have a plurality of ports for support of token ring protocol DTEs." '722 Patent, col.1 ll.52-56. The '722 Patent additionally claims certain modular cards in data networks. *See* '722 Patent, col.8 ll.23-44.

Fujitsu's invalidity contentions also provide insight into whether the term "modular card" is insolubly ambiguous to a person of ordinary skill in the art . In those contentions, Fujitsu stated that its cited references

> not only demonstrate that the design, operation, construction and use of a "modular card" and the placement of one or more components on a "modular card" was well known prior art to the '772 patent, but also that each "modular card" as recited in the claims of the '772 patent, alone and in combination with

> other "modular cards" and/or other claimed features, was well known prior art to the '772 patent.

(Fujitsu's Prelim. Invalidity Contentions 16 (attached as Ex. 5 to Tellabs's Resp.).)

The deposition testimony of Fujitsu's expert, Dr. Willner, does not undermine the definiteness of this claim term. When asked whether "engineers all agree" that a certain demultiplexer with two printed circuit boards was one modular card or two modular cards, Dr. Willner responded that "[n]ot all engineers would agree." (*See* Fujitsu's Op. Br. 64 (quoting 9/23/09 Tech. Tutorial Tr. 137:19-138:19).) Whether reasonable minds could differ as to the meaning of a claim term, however, does not render that term indefinite. *See Source Search*, 588 F.3d at 1076. Instead, the standard for indefiniteness is more demanding and requires clear and convincing evidence that the claims are insolubly ambiguous to a person of ordinary skill. *Microprocessor Enhancement*, 520 F.3d at 1374. The court disagrees with Fujitsu that Dr. Willner's testimony constitutes such evidence. The court has considered Fujitsu's additional arguments for finding that the term "modular card" is indefinite and finds they also lack merit.

Consequently, after considering both the intrinsic and extrinsic evidence, and remaining cognizant of the presumption of patent validity, the court finds that the claim term "modular card," in the context of the '772 Patent, had a discernible meaning to a person of ordinary skill. Fujitsu therefore has not established by clear and convincing evidence that the claim term "modular card" renders claims 11-13, 22, and 24 insolubly ambiguous. The court accordingly adopts Tellabs's proposed construction of "modular card" as "a card that can be added to or replaced in a slot of the system," which is consistent with the evidence presented to the court.

7. "office" and "reside in the same office" (claims 8 & 21)

Claims 8 and 21 in the '772 Patent require the certain components "reside in the same office." In its preliminary construction, this court was unable to construe the claim term "office" and "reside in the same office" without the benefit of extrinsic evidence. (Prelim. Constr. Op. 39.) Fujitsu argues that the term "reside in the same office" cannot be reasonably construed and, as a result, is indefinite. (Fujitsu's Op. Br. 61.) Tellabs, on the other hand, contends that "resides in the same office" is not indefinite and proposes that the court construe the term "office" to mean "central office." (Tellabs's Resp. 49.) For the following reasons, this court agrees with Tellabs and construes the term "office" in claims 8 and 21 to mean "a central office of a carrier."

Claim 8 recites: "[t]he optical add/drop multiplexing of claim 7, wherein the first, second and third optical line interfaces reside in a same office but each interface to separate WDM networks." '772 Patent, col.8 ll.13-16. Claim 21 similarly recites "[t]he method of claim 20, wherein the first, second and third optical line interfaces reside in a same office but each interface to separate WDM networks." *Id.* at col.10 ll.37-39.

According to Fujitsu, the claim term "reside in a same office" is "hopelessly ambiguous and vague" and consequently does not reasonably apprise one of ordinary skill of the bounds of the claims. (Fujitsu's Op. Br. 61.) Fujitsu cites the testimony of its expert, Dr. Willner, who stated that "office" is a vague term. (*Id.* at 62 (quoting 9/23/09 Tech. Tutorial Tr. 139:12-25).) Furthermore, according to Fujitsu, "central office," Tellabs's proposed construction, is just as ambiguous as "office" and lacks support in the '772 Patent. (*Id.* at 63.) In response, Tellabs argues that the term "office" is definite and that it should be construed to mean "central office." (Tellabs's Resp. 64.) The court agrees with Tellabs that Fujitsu has failed to prove by clear and convincing evidence that the term "office" is indefinite to a person of ordinary skill in the art.

Looking first to the intrinsic evidence, *Optical Networks* illustrates that "office" in the context of optical communication networks had a known meaning to one of ordinary skill. For example, *Optical Networks* explains:

> A carrier has a *central office* in every neighborhood in the regions where it operates. An access network is the part of the network that reaches out from a carrier's *central office* into individual homes and businesses. A local-exchange network is the part of the network that interconnects the carrier's *central offices* in a metropolitan area.

Optical Networks 2 (1998) (emphasis in original) (attached as Ex. 13 to Tellabs's Resp.). Figures 1.1 and 6.3 in *Optical Networks* also depict the "central office" in a public network. *Optical Networks* 3, 270 (1st ed. 1998); *see also id.* at 5, 249, 465, 482-86, 488, 497, and 510 (referring to a carrier's "central office").

Patents from the relevant time period also support Tellabs's position that "office" is not indefinite to a person of ordinary skill. U.S. Patent No. 5,822,519 ("'519 Patent"), which is assigned to Fujitsu Limited and titled "Method for Transferring Data to a Plurality of Modes Connected in Series by Employing an Intermediate Mode and Dividing the System into a Plurality of Virtual Groups," issued on October 13, 1998. The '519 Patent repeatedly refers to an "office," including claiming "[a] method of transferring information to a plurality of offices connected in a series in a network," which comprises the steps of, *inter alia*, "transferring said information from a first server office to an intermediate office being substantially intermediate in said plurality of offices." ('519 Patent, col.14 ll.15-20.)

Finally, Tellabs presents the declaration its expert, Dr. Kim Winick, as evidence that "office" is definite to one of ordinary skill and means "central office." According to Dr. Winick, the ordinarily skilled artisan "would understand that the optical line interfaces of an add/drop

multiplexing system ("OADM") system . . . must be in close physical proximity." (Winick Decl. ¶ 34 (attached to Tellabs's Resp.).) Because claims 8 and 21 recite that the optical line interfaces "reside in the same office," Dr. Winick opines that the person of ordinary skill would understand that "the optical line interfaces housed within an office will necessarily be in close physical proximity." (*Id.*) Dr. Winick further attests that the term "central office" is frequently used in the context of optical communication networks like those disclosed in the '772 Patent (*id.* ¶ 35), and that person of ordinary skill in the art of the '772 Patent would understand that the term "office," as recited in claims 8 and 21, refers to a "central office" (*id.*).

Based on the above evidence, the court finds that Fujitsu has not carried its burden of proving that the claim term "reside in the same office" in claims 8 and 21 of the '772 Patent is insolubly ambiguous to a person of ordinary skill. Moreover, both the intrinsic and extrinsic evidence presented by Tellabs supports a construction of the term "office" at the time of the invention to mean "central office of a carrier," and the court accordingly adopts that construction.

II. '737, '163, and '681 Patents (Optical Amplifier Patents)

The parties collectively refer to the '737, '163, and '681 Patents as the "Optical Amplifier Patents." These three patents all disclose and claim various features of optical amplifiers, which are devices used throughout long-haul optical fiber networks to increase the power level of the transmitted optical signals as they travel from node to node in the network. The optical amplifiers may be located both at the nodes in the network or between the nodes. (9/23/09 Tech. Tutorial Tr. 47:14-20.)

In a typical configuration of an optical amplifier, a pump light beam signal, usually supplied by a laser, and an input data signal are coupled together in an optical coupler. This combined signal travels through an rare earth doped fiber, such as an erbium-doped fiber. The pump light beam energizes the erbium-doped fiber, and the data signal receives gain. In other words, the power, in the form of the absorbed pump light, is transferred to the optical signal and produces "gain," i.e., amplifying the input signal so that the signal has more power at the output than it had at the input. (*See* 09/23/09 Tech. Tutorial Tr. 66:17-25; 2/23/10 Tech. Tutorial Tr. 450:1-6; Willner Tutorial 11.)

. A. Person of Ordinary Skill in the Art of the '737, '163, and '681 Patents

The parties agree that all three optical amplifier patents share a common definition of a person of ordinary skill in the art, and they do not dispute that such a person has at least a Master's degree in electrical engineering or physics as well as two to five years of experience in the applicable field of art. (*See* Case No. 09-5430, Dkt. No. 289.) The parties do not agree, however, on the applicable field of art. Tellabs proposes that the field of art is the "field of optical fiber transmission systems and the components for such systems," while Fujitsu defines the field more narrowly as "designing optical amplifiers or optical amplifier fiber communication systems." *Id.* Having review the parties' proposals and the optical amplifier patents, the court finds that Tellabs's broader definition of the field of art is appropriate for defining the person of ordinary skill. Although the optical amplifier patents all disclose optical amplifier technology, they also relate more broadly to optical fiber transmissions systems, including various components of those systems. Consequently, the court defines a person of ordinary skill in the art of the '737, '163, and '681 Patents to have at least a Master's degree in

electrical engineering or physics and two to five years of experience in the field of optical fiber transmission systems and the components for such systems.

B. '737 Patent

1. Background

The '737 Patent is titled "Optical Amplifier and Optical Communication System with Optical Amplifier Using Pumping Light Beam" and issued on May 28, 1996. Masuo Suyama is the named inventor, and Fujitsu Limited is the assignee. The '737 Patent is directed to the transmission of supervisory information on a supervisory channel through an optical amplifier. The supervisory channel communicates information about the network, including information about signal power, amplifier gain, and pump power. (Willner Tutorial 16.) Specifically, according to the '737 Patent, an object of the disclosed invention "is to provide an optical communication system having an optical fiber amplifier capable of transmission of information with a signal light beam." '737 Patent, col.2 ll.19-23.

Independent claim 4 of the '737 Patent recites:

> An optical amplifier for amplifying a first optical signal of a first wavelength and receiving a second optical signal of a second wavelength, said optical amplifier comprising:
>
> an optical fiber, doped with a rare earth element, having an input and an output;
>
> a semiconductor laser emitting a pumping light beam to one of the input and the output of said optical fiber;
>
> an optical coupler, optically coupled to the input of said optical fiber, for receiving a first optical signal of the first wavelength and a second optical signal of a second wavelength having a different wavelength from the first

wavelength, for introducing the first optical signal to the input of said optical fiber, and for branching the second optical signal; and

a signal receiver receiving the second optical signal.

Id. at col.7 l.65-col.8 l.13.

Independent claim 11 of the '737 Patent recites:

A method for amplifying an optical signal comprising the steps of:

emitting a pumping light beam;

receiving a first optical signal of a first wavelength and a second optical signal of a second wavelength;

branching the second optical signal from the first optical signal for receipt by a receiver; and

inputting the pumping light beam and the first optical signal to a rare earth element doped optical fiber.

'*Id.* at col.9 l.17-col.10 l.4.

2. Claim Constructions

The parties have identified the following three claim terms in the '737 Patent for the court's construction: "second optical signal of a second wavelength" (claims 4 & 11); "optical coupler" (claim 4); and "branching the second optical signal from the first optical signal" (claim 11).

a. "second optical signal of a second wavelength" (claims 4 & 11)

The claim term "second optical signal of a second wavelength" appears in both independent claims 4 and 11 of the '737 Patent. Tellabs proposes the following construction of this claim term: "a pumping light beam from an upward-bound line having a pumping light wavelength." (Tellabs's Op. Br. 44.) Fujitsu, on the other hand, contends that the correct

construction is the term's "ordinary meaning," which Fujitsu argues is "a second optical signal of a second wavelength that is different from the wavelength of the first optical signal." (Fujitsu's Resp. 3.) As explained below, the court adopts Fujitsu's proposed construction and construes the term "second optical signal of a second wavelength" to mean "a second optical signal of second wavelength that is different from the wavelength of the first wavelength."

Turning first to the claim language, the optical amplifier in claim 4 comprises, *inter alia*, "a semiconductor laser emitting a pumping light beam to one of the input and the output of said optical fiber," and "an optical coupler . . . for receiving a first optical signal of the first wavelength and a second optical signal of a second wavelength having a different wavelength from the first wavelength." '737 Patent, col.7 l.65-col.8 l.13. Relatedly, the method for amplifying an optical signal recited in claim 11 includes the steps of "emitting a pumping light beam" and "receiving a first optical signal of the first wavelength and a second optical signal of a second wavelength." *Id.* at col.9 l.17-col.10 l.4. Both claims, therefore, disclose "a pumping light beam" and first and second optical signals.

Tellabs argues that claims 4 and 11 describe three separate light beams/optical signals, two of which are pumping light beams. Specifically, the "first optical signal of a first wavelength" refers to signal being amplified; the "second optical signal of the second wavelength" refers to the pumping light beam from the previous optical amplifier received via an upward bound line; and the "pumping light beam" refers to pumping light beam emitted from the claim semiconductor laser in the claimed amplifier. (Tellabs's Reply 58, 62-63.) Thus, according to Tellabs, claim 4 neither "precludes the second optical signal and the pumping light beam from having the same wavelength" nor "precludes both the second optical signal and the pumping light

beam from being pumping light beams, just from [deriving from] different pumping light sources." (*Id.* at 62-63 (emphasis in original).) The court disagrees that the claim language supports limiting the "second optical signal of a second wavelength" to a "a pumping light beam from an upward-bound line having a pumping light wavelength."

Both claims 4 and 11 explicitly recite "a pumping light beam" that is input to the doped optical fiber. If Fujitsu had intended the "second optical signal of a second wavelength from the first wavelength" to be similarly limited to "a pumping light beam . . . having a pumping light wavelength," as Tellabs proposes, Fujitsu could have used this precise language in the claim, but it did not do so. Instead, it used the broader claim term "second optical signal of a second wavelength from the first wavelength."

Moreover, Tellabs's construction results in two inconsistent meanings of "optical signal," with the recited "first optical signal" having broader scope than the "second optical signal." Claim terms, however "are normally used consistently throughout the patent." *Phillips v. AWH Corp.*, 415 F.3d 1303, 1314 (Fed. Cir. 2005). *Chamberlain Group, Inc. v. Lear Corp.*, 516 F.3d 1331 (Fed. Cir. 2008), is instructive on this point. In *Chamberlain*, the Federal Circuit explained that the meaning "trinary code" was "relevant to construing 'binary code' because the term 'code' presumptively should carry the same meaning throughout the patent." *Id.* at 1337. In other words, "'binary code' and 'trinary code' should have parallel meanings, differing only insofar as 'binary' and 'trinary' differ in their relationships to the numbers 2 and 3." *Id.*

Similarly in this case, the court finds that one of ordinary skill in the art would understand that the term "optical signal" in the phrase "first optical signal of a first wavelength" should be interpreted consistently with the "optical signal" in the phrase "second optical signal of

a second wavelength." The claims, therefore, support Fujitsu's contention that "second optical signal of a second wavelength" means "a second optical signal of second wavelength that is different from the wavelength of the first wavelength."

The specification does not warrant limiting "second optical signal of a second wavelength" to "a pumping light beam from an upward-bound line having a pumping light wavelength," as Tellabs argues. "Generally, a claim is not limited to the embodiments described in the specification unless the patentee has demonstrated a 'clear intention' to limit the claim's scope with 'words or expression of manifest exclusion or restriction.'" *i4i Ltd. P'ship v. Microsoft Corp.*, 598 F.3d 831, 843 (Fed. Cir. 2010) (quoting *Liebel-Flarsheim Co. v. Medrad, Inc.*, 358 F.3d 898, 906 (Fed. Cir. 2004)). Here, although the preferred embodiments in the specification do disclose a second optical signal that is the pumping light beam from the previous optical amplifier, *see, e.g.,* '737 Patent, col.5 ll.30-38,[9] the specification does not demonstrate a "clear intention" to limit the second optical signal to a "pumping light beam from an upward-bound line having a pumping light wavelength."

The court is similarly unpersuaded by Tellabs's argument that Fujitsu limited the term "second optical signal of a second wavelength" to "a pumping light beam having a pumping light wavelength" during the '737 Patent's prosecution. "[F]or prosecution disclaimer to attach,

---

[9] For example, in describing one embodiment, the specification instructs that "[t]he optical fiber amplifier 24 comprises a dichroic coupler 26 and a rare-earth-doped fiber 28 . . . . The dichroic coupler 26 splits the beams from the optical coupler 21 into the signal light beam and the pumping light beam, and leads the signal light beam into the rare-earth-doped fiber 28 and the pumping light beam into a receiver 32. The dichroic coupler 26 further reflects a pumping light beam from a pumping light source 30 into the rare-earth-doped fiber." '737 Patent, col.5 ll.30-38. In this embodiment, the pumping light beam that enters receiver 32 is the second optical signal.

[Federal Circuit] precedent requires that the alleged disavowing actions or statements made during prosecution be both clear and unmistakable." *Lazare Kaplan Int'l, Inc. v. Photoscribe Techs., Inc.*, 628 F.3d 1359, 1370 (Fed. Cir. 2010) (first alteration in original) (quoting *Omega Eng'g, Inc. v. Raytek Corp.*, 334 F.3d 1314, 1325-26 (Fed. Cir. 2003)). Here, the statements in the prosecution history identified by Tellabs do not clearly and unmistakably limit the "second optical signal of a separate wavelength" in claims 4 and 11 to "a pumping light beam from an upward-bound line having a pumping light wavelength."

First, Tellabs relies on Fujitsu's response to the examiner's 35 U.S.C. § 112 ¶ 1 rejection. In the July 11, 1995 Office Action, the examiner stated that "[t]here is no support in the specification for the connecting means or branching means receiving a first optical signal of a first wavelength and a second optical signal of a second wavelength different from the first wavelength, and branching the second optical signal for reception by a receiver." (July 11, 1995 Office Action at J.A. 1322.) In response, Fujitsu identified the support in the specification for the second optical signal of a second wavelength:

> Specifically, lines 6-12 on page 11 of the substitute specification discloses that the dichroic coupler 26 splits beams from the optical coupler 21 into a signal light beam and a pumping light beam. The signal light beam is reflected to the rare-earths doped fiber 28 and the pumping light beam is supplied to a receiver 32. The optical wavelengths of the signal light beam and the pumping light beam are different.

(Aug. 31, 1995 Am. at J.A. 1338.) As discussed above, under the Federal Circuit's *SunRace* decision, merely identifying for the examiner the support for the "second optical signal" in the specification does not constitute a "clear and unmistakable" disavowal of all optical signals other than pumping light beams with pumping light wavelengths. *See SunRace*, 336 F.3d at 1307.

Tellabs also contends that Fujitsu's response to the examiner's 35 U.S.C. § 112 ¶ 2 indefiniteness rejection demonstrates that Fujitsu limited the "second optical signal of a separate wavelength" to only pumping light beams with a pumping light wavelength. Again, the court disagrees. In the July 11, 1995 Office Action, the PTO examiner rejecting claims 9, 12, 17, 18, and 21 under § 112 ¶ 2, stating that those claims "do not clearly point out what the sources of the first and second optical signals are or from where the signals are received." (July 11, 1995 Office Action at J.A. 1322.) In response to the rejection, Fujitsu amended the claims and further stated:

> Applicant traverses the Examiner's rejection of Claims 9, 12, 17, 18 and 21 for not pointing out the sources of the first and second optical signals. The particular sources of these signals do no matter and thus, do not need to be recited. Applicant has, however, to expedite prosecution, recited in the preamble that the optical amplifier receives a first and a second optical signal.

(Aug. 31, 1995 Am. at J.A. 1339-40.)

Tellabs has not explained how the amendments to the claims demonstrate that Fujitsu intended to narrow the "second optical signal" from its ordinary meaning to a pumping light beam with a pumping light wavelength. To the contrary, rather than clearly and unmistakably disavowing optical signals other than pumping light beams, Fujitsu's statement to the examiner suggests that the source of the second optical signal is not relevant to the claimed invention and thus the second optical signal need not derive from a pump source.

Nor does the prosecution history for U.S. Patent No. 5,299,048 ("048 Patent"), the parent to the '737 Patent, support limiting the "second optical signal . . ." to Tellabs's proposed construction. In the December 8, 1992 Amendment to the '048 Patent, Fujitsu stated: "The optical communication system of the invention also provides not just a single, but two, ways of transmitting information along the optical fiber link. The invention accomplishes this by

providing information in signals not only in the signal light beam, but also in the pumping light beam itself." (J.A. 2002.) The '048 Patent's claims, however, do not recite a "second optical signal," and this term was not addressed in the December 8, 1992 Amendment. In *Ventana Medical Systems, Inc. v. Biogenex Laboratories, Inc.*, 473 F.3d 1173 (Fed. Cir. 2006), the Federal Circuit explained that "the doctrine of prosecution history disclaimer generally does not apply when the claim term in the descendant patent uses different language." *Id.* at 1182. Thus, this court finds that the '048 Patent's prosecution history does not affect the scope of "second optical signal of a second wavelength" in the '773 Patent.

The court finds that it need not consider extrinsic evidence in the form of expert declarations to construe this claim term. Accordingly, based on the intrinsic evidence discussed above, the court construes "second optical signal of a second wavelength" in claims 4 and 11 of the '737 Patent to mean "a second optical signal of second wavelength that is different from the wavelength of the first wavelength."

b. "optical coupler" (claim 4)

The term "optical coupler" appears in claim 4 of the '737 Patent. Fujitsu proposes the following construction of "optical coupler": "Ordinary meaning. A device that combines or splits signals." (Fujitsu's Resp. 10.) Tellabs, on the other hand, contends that the proper construction is "a dichroic coupler that passes the first wavelength and reflects the second wavelength." (Tellabs's Op. Br. 47-48.) For the reasons explained below, the court adopts Fujitsu's construction and construes the term "optical coupler" to mean "optical coupler that combines or splits optical signals."

The parties do not dispute that at the time of the invention of the '737 Patent, the term "optical coupler" generally was a broad term. (*See* Tellabs's Reply 70.) Optical couplers are devices used to combine or split optical signals as depicted in Figures 6 and 7 of the '737 Patent and include both dichroic and broadband couplers. A broadband coupler refers to a wavelength-independent optical coupler. (Willner Decl. ¶ 20 (attached Ex. A-3 to Fujitsu's Resp.).) A dichroic coupler, on the other hand, is a wavelength-selective optical coupler. (*Id.*)

Despite recognizing that the term "optical coupler" to a person of ordinary skill generally is broader than the term "dichroic coupler," Tellabs argues that the "optical coupler" recited in claim 4 must be limited to a dichroic coupler because the '737 Patent's specification does not disclose other methods of signal splitting beyond a dichroic coupler. Additionally, Tellabs contends that Fujitsu disavowed other optical coupling devices during the prosecution of the '737 Patent. In response, Fujitsu argues that limiting the optical coupler to a dichroic coupler improperly narrows the term beyond its ordinary and customary meaning. Fujitsu further asserts that the it did not disavow all optical couplers other than dichroic couplers during the prosecution of the '737 Patent. The court agrees with Fujitsu.

Looking first to the claim language, claim 4 recites, *inter alia*, "an optical coupler . . . for receiving a first optical signal of a first wavelength and a second optical signal of a second wavelength, for introducing the first optical signal to the input of said rare earth element doped optical fiber, and for branching the second optical signal." '737 Patent, col.8 ll.5-12. Claim 4 does not include any limitation on the type of optical coupler. Nor does it require that the optical coupler possess the functionality to pass the first optical signal and reflect the second optical signal as Tellabs contends. Claim 4 only requires that the optical coupler "receiv[e]" the first and

second optical signals, "introduc[e]" the first optical signal to the input of the optical fiber, and "branch[]" the second optical signal. *Id.*

The specification similarly does not evidence Fujitsu's intention to limit the claimed optical coupler to dichroic coupler. Although the specification repeatedly refers to a "dichroic coupler," *see, e.g., id.* at col.5 ll.30-32, as discussed above, a claim generally is not "limited to the embodiments described in the specification unless the patentee has demonstrated a 'clear intention' to limit the claim's scope with 'words or expression of manifest exclusion or restriction.'" *i4i Ltd. P'ship v. Microsoft Corp.*, 598 F.3d 831, 843 (Fed. Cir. 2010) (quoting *Liebel-Flarsheim Co. v. Medrad, Inc.*, 358 F.3d 898, 906 (Fed. Cir. 2004)). Having reviewed the specification, the court finds that the specification does not manifest Fujitsu's "clear intention" to limit optical couplers to dichroic couplers. The specification for the '737 Patent similarly does not indicate that the optical coupler in claim 1 must *pass* the first wavelength and *reflect* the second wavelength. To the contrary, the word "pass" does not appear in the specification, and the word "reflect" appears only once, *see* '737 Patent, col.5 ll.36-38 ("The dichroic coupler 26 further reflects a pumping light beam from a pumping light source 30 into the rare-earth-doped fiber 28."). Fujitsu's expert, Dr. Willner, further attests that "not all optical couplers operate by passing and reflecting light," and some optical couplers instead "operate through evanescent coupling." (Willner Decl. ¶ 22.)

Finally, the '737 Patent's prosecution history does not support narrowing the term "optical coupler" beyond its ordinary and customary meaning. Tellabs contends that during prosecution of the '737 Patent, Fujitsu disavowed optical couplers other than dichroic couplers that pass a first wavelength and reflect a second wavelength. Specifically, Tellabs relies on Fujitsu's response to

the examiner's 35 U.S.C. §112 ¶ 1 rejection in the July 11, 1995 Office Action discussed above in connection with the "second optical wavelength" claim term, as evidence of this disavowal. Again, in that Office Action, the examiner rejected certain claims, finding that "[t]here is no support in the specification for the connecting means or branching means receiving a first optical signal of a first wavelength and a second optical signal of a second wavelength different from the first wavelength and branching the second optical signal for reception by a receiver." (July 11, 1995 Office Action at J.A. 1322.)

In its August 31, 1995 Amendment, Fujitsu identified for the PTO examiner the support in the specification for the means-plus-function claim terms, "connecting means" and "branching means," including noting that the "substitute specification discloses that the *dichroic coupler* 26 splits beams from the optical coupler 21 into a signal light beam and a pumping light beam." (Aug. 31, 1995 Am. at J.A. 1338.) As discussed above, simply identifying support in the specification in response to a § 112 ¶ 1 rejection does not unambiguously limit the claim scope to what Fujitsu identified in the specification. This statement is not the type of "clear and unambiguous disavowal" of claim scope that supports significantly limiting "optical coupler" in claim 1 to "dichroic coupler that passes the first wavelength and reflects the second wavelength."

The Federal Circuit decisions cited by Tellabs do not support narrowing the term "optical coupler" beyond its ordinary meaning. In *ICU Medical v. Alaris Medical Systems, Inc.*, 558 F.3d 1368 (Fed. Cir. 2009), the court construed the claim term "spike" to require a pointed tip, which was consistent with both the ordinary meaning of the term and the use of "spike" in the specification. The Federal Circuit, therefore, did not rely on the specification to limit the claim term beyond its ordinary meaning as Tellabs asks this court to do here.

Similarly in *Nystrom v. Trex Co.*, 424 F.3d 1136 (Fed. Cir. 2005), the Federal Circuit concluded that the claim term "board" should be limited to "wood cut from a log." In reaching this conclusion, the court not only found that the specification "consistently used the term 'board' to describe wood decking material cut from a log," but also emphasized the inventor's references to the board as a wood material in the prosecution history. *Id.* at 1144. Specifically, the inventor argued that a prior art reference was "clearly not concerned with material made from wood" to avoid an obviousness rejection. *Id.* Here, in contrast, Fujitsu did not attempt to overcome an obviousness rejection in the PTO by arguing that the prior art did not disclose a dichroic coupler or an optical coupler that passes a first optical signal and reflects a second optical signal.

In *Irdeto Access, Inc. v. Echostar Satellite Corp.*, 383 F.3d 1295 (Fed. Cir. 2004), the court held that the claim term "group" referred "only to a subset of all subscribers to the claimed broadcast system." According to the Federal Circuit, narrowing the construction of "group" to the disclosures in the specification was appropriate because the inventor conceded during prosecution that the term did not have an ordinary meaning in the art. *Id.* at 1301, 1303-04. Instead, the inventor acted as his own lexicographer and defined the term in the specification. In this case, the prosecution history does not contain such an admission that the term "optical coupler" lacked an agreed upon meaning to one of skill in the art. *Id.*

The court has considered Tellabs's additional arguments in support of its proposed construction and finds they also lack merit.[10] Consequently, the court declines Tellabs's invitation

[10] Tellabs also argues that the court should not adopt Fujitsu's proposed construction of "optical coupler" because under that construction the claim is not enabled Tellabs, however, has provided only cursory analysis as support for this argument, particularly of the applicable (continued...)

to narrow the scope of the optical coupler in claim 1 to dichroic couplers that pass the first optical signal and reflect the second optical signal. Instead, the court construes that term "optical coupler" in accordance with its ordinary and customary meaning to a person of skill in the art to mean "a device that combines or splits signals."

c. "branching the second optical signal from the first optical signal" (claim 11)

The claim term "branching the second optical signal from the first optical signal" appears in method claim 11 of the '737 Patent. In its proposed construction, Tellabs includes the same limitations it proposed in connection with its construction of the claim term "optical coupler" recited in claim 1. Namely, Tellabs contends that "branching the second optical signal from the first optical signal" means "splitting the second optical signal from the first optical signal using a dichroic coupler that passes the first wavelength and reflects the second wavelength." (Tellabs's Op. Br. 48.) Fujitsu, however, proposes that the court construe the term to mean "splitting the second optical signal from the first optical signal." (Fujitsu's Resp. 14.) Again, the court agrees with Fujitsu.

The parties do not dispute that "branching," as used in claim 11, means "splitting" to a

---

[10](...continued)
legal standards for addressing enablement. (*See* Tellabs's Reply 71; 12/7/10 *Markman* Tr. Vol. 5, 606:19-607:16; Case No. 09-4530, Dkt. No.262, Tellabs's '737 Patent Presentation 53-57.) This court accordingly does not address the enablement issues at this time but recognizes that such issues may be raised by separate motion if appropriate based on the court's claim construction.

person of ordinary skill. Instead, the issue is whether the branching of the second optical signal from the first optical signal must occur via a "dichroic coupler that passes the first wavelength and reflects the second wavelength" as Tellabs contends.

Turning first to the claim language, claim 11 does not expressly identify the structure performing the "branching" step, and the Federal Circuit has cautioned against imposing such structural limitations into a method claim when those limitations are not included in the language of the claim. *See DSW, Inc. v. Shoe Pavilion, Inc.*, 537 F.3d 1342, 1348 (Fed. Cir. 2008) ("Because claims 4-6 are unambiguous . . . and are directed to a method for using an apparatus, not to its structure or assembly, it was improper for the trial court to import limitations from the apparatus and system claims into the method claims."); *Epcon Gas Sys., Inc. v. Bauer Compressors, Inc.*, 279 F.3d 1022, 1032 (Fed. Cir. 2002) ("The method of claim 2 does not mention structure by which the 'venting' is to be performed. Thus, Epcon is correct that the district court improperly imported language from the specification into the claim."). Tellabs appears to have accepted this point, and at the claim construction hearing conceded that a construction of "branching the second optical signal . . . ." that does not include Tellabs's proposed "dichroic coupler" limitation was "similarly supported by the intrinsic evidence." (Case No. 09-4530, Dkt. No. 262, Tellabs's '737 Patent Presentation 78.)

Additionally, like claim 1, claim 11 similarly does not indicate that the "branching" step requires the passing of the first optical signal and the reflecting of a second optical signal. The claim language, therefore, does not support Tellabs's proposed limitations on the claimed "branching" step.

Finally, as explained more thoroughly above in the court's discussion of the claim term "optical coupler," the court finds that neither the specification nor the prosecution history demonstrates that the splitting of the second optical signal from the first optical signal must occur via a "dichroic coupler" or requires "passing the first wavelength and reflecting the second wavelength."

For the above reasons, the court finds that Tellabs's proposed construction of "branching the second optical signal from the first optical signal" improperly narrows the meaning of that term beyond its plain and ordinary meaning to one of skill familiar with the disclosures of the '737 Patent. The court therefore construes "branching the second optical signal from the first optical signal" to mean "splitting the second optical signal from the first optical signal."

C. '163 Patent

1. Background

Both the '737 and '163 Patents claim priority to the same Japanese patent application and share the same specification. The '163 Patent is titled "Optical Amplifier and Optical Communication System with Optical Amplifier Using Pumping Light Beam," and issued on June 11, 1996. It generally relates to controlling the output power of a semiconductor laser used to pump an optical amplifier. The optical amplifier includes a feedback loop whereby the amplifier detects the power level of the wavelength channels transmitted through the erbium-doped fiber and adjusts the pump laser to change the gain and maintain substantially constant gain for each wavelength channel. (*See* Case No. 08-3379, Dkt. No. 265 ("Fujitsu's Op. Amp. Presentation") 3; Willner Tutorial 15.)

Claim 5 of the '163 Patent recites:

> An optical amplifier, comprising:
>
> a semiconductor laser which emits a pumping light beam;
>
> a rare earth element doped optical fiber having an input end and an output end;
>
> a first optical coupler to input an optical signal and the pumping light beam to the input end of said optical fiber;
>
> a second optical coupler which splits an output optical signal from the output end of said rare earth element doped fiber into first and second output optical signals;
>
> a level detector which detects a level of the second output optical signal; and
>
> a power control circuit which controls an output level of said semiconductor laser based on the detected level.

'163 Patent, col.8 ll.1-15.

Claim 24 of the '163 Patent recites:

> A method of amplifying an optical signal by an optical fiber, doped with a rare-earth element and having an input end and an output end, comprising the steps of:
>
> emitting a pumping light beam;
>
> coupling the optical signal to the input end of the optical fiber;
>
> coupling the pumping light beam to either the input end or the output end of the optical fiber;
>
> splitting an output optical signal from the output end of the optical fiber into first and second output optical signals; and
>
> controlling an output level of the emitted light beam based on the second output optical signal.

Id. at col.12 ll.1-14.

2. Claim Constructions

The parties have identified two terms in the '163 Patent for the court's construction: "a first optical coupler" (claim 5), and "coupling" (claim 24).

a. "a first optical coupler" (claim 5)

The claim term "first optical coupler" appears in claim 5 of the '163 Patent. Tellabs argues that "first optical coupler" is "a first dichroic coupler at the input end of the doped optical fiber that passes the signal wavelength and reflects the pumping light wavelength." (Tellabs's Op. Br. 69.) Tellabs does not appear to dispute that its proposed construction requires locating the first optical coupler at the input end of the optical fiber without any intervening structures between the first optical coupler and the optical fiber. Fujitsu, on the other hand, contends that Tellabs's proposed construction is overly narrowly and instead proffers the following construction: "Ordinary meaning. A device that combines or splits optical signals." (Fujitsu's Resp. 15.) As explained below, the court construes "first optical coupler" to mean "a device that combines or splits optical signals."

The '737 and '163 Patent share the same specification and many common terms. The court, therefore, "must interpret the claims consistently across all asserted patents." *NTP, Inc. v. Research In Motion, Ltd.*, 418 F.3d 1282, 1293 (Fed. Cir. 2005) ("Because NTP's patents all derive from the same parent application and share many common terms, we must interpret the claims consistently across all asserted patents."). As discussed above, this court construes "optical coupler" in claim 4 of the '737 Patent to mean "a device that combines or splits optical signals," and this construction is consistent with Fujitsu's proposed construction of "first optical coupler" in the '163 Patent.

The '163 Patent's intrinsic evidence also supports Fujitsu's proposed construction. First addressing the claim language, claim 5 claims an optical amplifier comprising, *inter alia*, "a first

optical coupler to input an optical signal and the pumping light beam to the input end of said optical fiber," and "a second optical coupler which splits an output optical signal from the output end of said rare earth element doped fiber into first and second output optical signals." '163 Patent, col.8 ll.5-10. The plain language of claim 5 does not require that the optical coupler be a dichroic coupler. Moreover, Tellabs's proposed construction runs afoul of the general rule of claim construction that the same claim terms "are normally used consistently throughout the patent." *Phillips*, 415 F.3d at 1314. The "first optical coupler," as construed by Tellabs, is a "first dichroic coupler." This proposed construction suggests the presence of "second dichroic coupler," but Tellabs has not asked the court limit the "second optical coupler" recited in claim 5 to a dichroic coupler. Consequently, if the court were to adopt Tellabs's proposed construction, the first and second optical couplers would have inconsistent meanings. *See Chamberlain Group, Inc. v. Lear Corp.,* 516 F.3d 1331, 1337 (Fed. Cir. 2008).

Turning to the specification, as discussed above in connection with the '737 Patent, the '163 Patent's specification does not evidence a "clear intention" to limit the "first optical coupler" to a dichroic coupler, nor does it demonstrate that the optical coupler must "pass[] the signal wavelength and reflect[] the pumping light wavelength." *See i4i Ltd. P'ship v. Microsoft Corp.*, 598 F.3d 831, 843 (Fed. Cir. 2010). Additionally, Tellabs has not identified anything in the specification supporting its proposed limitation as to the location of the first optical coupler, i.e., that the coupler must be located "at the input end of the doped optical fiber."

Moreover, Tellabs concedes that "a person of ordinary skill in the art would understand that the claimed 'first optical coupler' could be a broadband coupler" but contends that using such a coupler "would be extremely inefficient." (Tellabs's Reply 77.) Tellabs has not cited any

Federal Circuit authority supporting its position that efficiency considerations should inform the court's claim construction analysis, and the court disagrees that such considerations warrant imposing limitations into the claims. *See SmithKline Beecham Corp. v. Apotex Corp.*, 403 F.3d 1331, 1340 (Fed. Cir. 2005) ("[T]his court has repeatedly stated that a court must construe claims without considering the implications of covering a particular product or process.").

The excerpts from the prosecution history cited by Tellabs also do not support narrowly defining "first optical coupler." During the prosecution of the '163 Patent, the examiner rejected the claims as anticipated by or obvious over the Desurvire patent, U.S. Patent No. 5,005,175. July 12, 1995 Office Action at J.A. 1522-23. In response to the examiner's rejection, Fujitsu argued that Desurvire disclosed coupling the optical signal to be amplified *to the middle* of the amplifying fiber: "Since the amplifier of **Desurvire et al.** does not provide an optical coupler at an output end of the doped amplifying fiber but instead employs evanescent coupling by employing an optical coupler *at a middle portion* of the doped amplifying fiber, it is difficult to provide sufficient signal power for monitoring." (Sept. 6, 1995 Am. at J.A. 1569 (second emphasis added).) Distinguishing Desurvire from the disclosed invention, Fujitsu further contended that the independent claims of the '163 Patent "all specify providing an optical signal and a pumping light beam to the input end of the doped optical fiber, and splitting an output optical signal from the output end of the doped optical fiber. These features are not taught or suggested by the **Desurvire et al.** patent." *Id.* (emphasis in original). Fujitsu also amended claim 5 of the '163 Patent to require that the first optical coupler input the optical signals in to the input *end* as opposed to just an input:

> a rare earth element doped optical fiber having an input end and an output end;

> a first optical coupler to input a first optical signal and the pumping light beam to the input end of said optical fiber;
>
> a second optical coupler which splits an output optical signal from the output end of said rare earth element doped fiber into first and second output optical signals . . . .

Id. at J.A. 1557.[11]

Based on its review of the prosecution history, the court agrees with Fujitsu that these statements to the examiner and the corresponding amendments to claim 5 do not require that the first optical coupler be located at the input end of the optical fiber without any intervening structures, as Tellabs's proposed construction suggests. Rather, these statements only demonstrate that the optical coupler inputs the optical signal at the input end, as opposed to the middle, of the optical fiber. This limitation is expressly set forth in the language of claim 5: "a first optical coupler to input an optical signal and the pumping light beam *to the input end of said optical fiber*." '163 Patent, col.8 ll.5-7.

The language of claim 6 also undermines Tellabs's prosecution history disclaimer arguments. Claim 6 depends from claim 5, and independent claims are "are naturally broader than their dependent counterparts." *Baldwin Graphic Sys., Inc. v. Siebert, Inc.*, 512 F.3d 1338, 1345 (Fed. Cir. 2008). Under the doctrine of claim differentiation, "the presence of a dependent claim that adds a particular limitation gives rise to a presumption that the limitation in question is not present in the independent claim." *Phillips*, 415 F.3d at 1315. Here, claim 5, in addition to stating that the claimed optical amplifier includes a first optical coupler to input the optical signal and pumping light beam "to the input end" of the optical fiber, further recites "a second optical coupler

[11] The underlined text was added in the September 6, 1995 Amendment.

which splits an output optical signal *from the output end*" of the optical fiber. Dependent claim 6 adds the additional limitation of placing an "optical isolator" between the output end of the optical fiber and the second optical coupler: "An optical amplifier according to claim 5, further comprising: an optical isolator arranged between the output end of said rare earth element doped optical fiber and said second optical coupler." The word "end" in "output end" in claim 6 was also added in the September 6, 1995 Amendment. (*See* J.A. 1558.)

Tellabs is correct that claim 6 refers to the second, not the first, optical coupler. Nevertheless, the same claim terms are to be construed consistently throughout the patent. *Phillips*, 415 F.3d at 1314. Here, in relying on the prosecution history, Tellabs implies that the addition of the word "end" to "input end" in claim 5 during the prosecution of the '168 Patent supports its position that the first optical amplifier must be directly connected to the input end of the optical fiber without any intervening structures. Applying Tellabs's interpretation of the claim term "end"consistently throughout claim 5, the second optical coupler in claim 5, which "splits an output optical signal from the output *end*" of the optical fiber would similarly need to be directly connected to the output end of optical fiber.

Claim 5, however, is presumed to be broader than dependent claim 6 and therefore must at least include claim 6's limitation, i.e., an optical amplifier where the second optical coupler is not directly connected to the optical fiber but instead is separated from the fiber by an optical isolator. Thus, although not dispositive for this court's claim construction of "first optical coupler," the language of claim 6 also supports the court's conclusion that by amending claim 5 to recite "input end" Fujitsu did not disclaim all optical couplers other than those directly connected to the input end of the optical fiber without intervening structures.

For the above reasons, the court construes the claim term "first optical coupler" in claim 5 of the '163 Patent to mean "a device that combines or splits optical signals," which is consistent with this court's construction of "optical coupler" in the '737 Patent.

b. "coupling" (claim 24)

The disputed claim term "coupling" appears in method claim 24 of the '163 Patent. Fujitsu initially contended that "coupling" means "inputting" but has since withdrawn that proposed construction and now contends that "coupling" needs no construction. (*See* Case. No. 09-4530, Dkt. No. 288.) Tellabs, in contrast, argues that the court should construe coupling to mean "directly introducing by passing or reflecting using a dichroic coupler." (Tellabs's Op. Br. 49-50.) The parties' arguments regarding the term "coupling" in claim 24 closely mirror their arguments related to the "first optical coupler" term in claim 5 of the '168 Patent. For the following reasons, the court agrees with Fujitsu that the term "coupling" does not require further construction.

The court first looks to the language of the claims. Based on the plain language of claim 24, the "coupling" steps involve "coupling the optical signal to the input end of the optical fiber" and "coupling the pumping light beam to either the input end or the output end of the optical fiber"; neither step includes any structural limitations for performing the these coupling steps. Thus, as discussed above, Tellabs's proposed construction of "coupling," which requires the use of a dichroic coupler, is improper. *See DSW, Inc. v. Shoe Pavilion, Inc.*, 537 F.3d 1342, 1348 (Fed. Cir. 2008); *Epcon Gas Systems, Inc. v. Bauer Compressors, Inc.*, 279 F.3d 1022, 1032 (Fed. Cir. 2002). Moreover, Tellabs concedes that "a person of ordinary skill in the art would understand

that the claimed 'coupling' steps could be implemented with a broadband coupler" but contends that using such a coupler "would be extremely inefficient." (Tellabs's Reply 81.) Again, Tellabs has not cited any Federal Circuit authority supporting its position that efficiency considerations should inform the court's claim construction analysis, and for the reasons discussed above in connection with the "first optical coupler" claim term, the court declines to rely on such considerations to impose limitations into the claims. The claims similarly do not indicate that the coupling involves "directly introducing by passing or reflecting." Instead, the claims demonstrate that the "coupling" step only involves coupling the optical signal to the input end of the optical fiber and coupling the pumping light beam to either the input end or the output end of the optical fiber.

Tellabs further contends that the prosecution history for the '163 Patent supports its proposed construction. Specifically, Tellabs relies on the same statements in the prosecution history that the court has discussed above in connection with the "first optical coupler" claim term, arguing that these statements demonstrate that the "claimed 'coupling' must be *directly to an end* of the doped optical fiber." (Tellabs's Op. Br. 50 (emphasis added).) For the reasons explained above, the court does not find that these statements clearly disavow all coupling that is not directly to an end of the doped optical fiber.

The court also consults the dictionary definitions identified by Fujitsu to assist in defining "coupling" as that term was understood to a person of ordinary skill in the art. "Dictionaries or comparable sources are often useful to assist in understanding the commonly understood meaning of words . . . ." *Phillips*, 415 F.3d at 1322. *Webster's Ninth New Collegiate Dictionary* (9th ed. 1985) defines "coupling" as "the act of bringing or coming together." *Id.* at 299 (attached as Ex.

A-14 to Fujitsu's Resp.).) The *Communications Standard Dictionary* (1983) provides the following definition of "coupling":

> The connection, attachment, or binding of optical elements, electrical circuit elements, electric and magnetic fields, propagation modes, or electromagnetic wave components (such as surface waves and evanescent waves) to internal waves in waveguides, dielectric slabs, or other interdependent associations and interactions of events and materials in a system. For example, two optical fibers or certain elements in an integrated optical circuit may be coupled together in some manner to preserve signal continuity. It is the means by which signals are transferred from one conductor, including a fortuitous conductor, to another.

Id. at 197 (attached as Ex. A-12 to Fujitsu's Resp.).

The court finds that the above evidence is sufficient for the court determine the customary and ordinary meaning of "coupling" to a person of ordinary skill and has not resorted to the parties' respective expert declarations or additional extrinsic in reaching its construction. Based on a careful review of the intrinsic evidence, the submitted dictionary definitions, and the parties' respective arguments, agrees with Fujitsu that the term "coupling" needs no further construction.

D. '681 Patent

1. Background

The '681 Patent issued on June 5, 2007 and is titled "Controller Which Controls a Variable Optical Attenuator to Control the Power Level of a Wavelength-Multiplexed Optical Signal When the Number of Channels Are Varied." Yasushi Sugaya and Susumu Kinoshita are the named inventors, and Fujitsu Limited is the assignee. The Japanese priority application, serial no. 8-111447 that led to the '681 Patent was originally filed on May 2, 1996, and the application that led to the '681 Patent was filed on April 28, 1997.

The ‘681 Patent is directed to the ability to control the gain of the optical amplifier depending on the number of wavelength division multiplexed channels that are input into the amplifier. (2/23/10 Tech. Tutorial Tr. 466:22-25.) As the number of wavelength channels entering the amplifier from the network changes, the required gain also changes. (*Id.* at 470:11-24.) For example, if the number of channels entering the amplifier decreases, less gain is needed, and the amplifier would decrease the amount of pump power. (*Id.*)

Relatedly, each wavelength amplified in the optical amplifier receives a different amount of gain depending on the wavelength. (*Id.* at 472:3-473:16.) The ‘681 Patent discloses introducing a loss element, such as a filter, that would equalize the gain across the wavelengths. (*Id.*)

The Abstract for the ‘681 Patent describes the disclosed invention as:

> An optical amplifier which amplifies a wavelength division multiplexed (WDM) optical signal having a variable number of channels associated with different wavelengths and outputs the amplified WDM optical signal. The optical amplifier includes (a) an optical attenuator which controls a level of the amplified WDM optical signal, and (b) a controller which controls the WDM optical signal to be amplified with an approximately constant gain.

‘681 Patent, Abstract.

Claim 1 of the ‘681 Patent recites:

> An optical transmission system comprising:
>
> a transmitting terminal transmitting a wavelength division multiplexed (WDM) optical signal having a variable number of channels associated with different wavelengths; and
>
> an optical amplifier which amplifies the WDM optical signal from the transmitting terminal with a gain and outputs the amplified WDM optical signal, the optical amplifier including:
>
> an *optical attenuator* which controls a level of the amplified WDM optical signal,

an optical filter which makes the gain *substantially even* with respect to said different wavelengths, and

a controller which controls the gain to be approximately constant.

Id. at col.22 ll.4-18 (emphasis added).

Claim 14 recites in pertinent part:

An apparatus comprising: . . .

an *optical attenuator* which controls a level of the first stage amplified WDM optical signal and outputs the controlled WDM optical signal, . . .

an optical filter making the gain *substantially flat* with respect to said different wavelengths, ...

Id. at col.23 l.20-col.24 l.15 (emphasis added).

2. Claim Constructions

The parties have identified three terms in the '681 Patent for the court's construction: "substantially even" (claims 1, 6 & 9); "substantially flat" (claim 14); and "optical attenuator" (claims 1, 6, 9, and 14).

a. "substantially even" (claims 1, 6 & 9) and "substantially flat" (claim 14)

The claim term "substantially even" appears in claims 1, 6, and 9 of the '681 Patent, and the claim term "substantially flat" appears in claim 14. The parties addressed these two term together in their presentations, as will the court. This court, in its preliminary construction, determined that it could not construe these terms based only on the presented intrinsic evidence. (Prelim. Constr. 39.) Tellabs contends that both claim terms are indefinite because the '681 Patent provides no standards for measuring whether the gain is "substantially even" or "substantially flat." (Tellabs's Op. Br. 51-52.) Fujitsu, however, argues that these terms are

definite and proposes the following construction: "Ordinary meaning. Even/flat within reasonable engineering tolerances." (Fujitsu's Resp. 21.) For the reasons explained below, the court agrees with Fujitsu that these terms are definite. The court, however, construes "substantially even/flat" to mean "largely, but not wholly flat/even."

. In *Verve, L.L.C. v. Crane Cams, Inc.*, 311 F.3d 1116 (Fed. Cir. 2002), the Federal Circuit discussed the propriety of using terms of degree such as "substantially":

> Expressions such as "substantially" are used in patent documents when warranted by the nature of the invention, in order to accommodate the minor variations that may be appropriate to secure the invention. Such usage may well satisfy the charge to "particularly point out and distinctly claim" the invention, 35 U.S.C. § 112, and indeed may be necessary in order to provide the inventor with the benefit of his invention. In *Andrew Corp. v. Gabriel Elecs. Inc.*, 847 F.2d 819, 821-22 (Fed. Cir. 1988)[,] the court explained that usages such as "substantially equal" and "closely proximate" may serve to describe the invention with precision appropriate to the technology and without intruding on the prior art. The court again explained in *Ecolab Inc. v. Envirochem, Inc.*, 264 F.3d 1358, 1367 (Fed. Cir. 2001)[,] that "like the term 'about,' the term 'substantially' is a descriptive term commonly used in patent claims to 'avoid strict numerical boundary to the specified parameter,'" quoting *Pall Corp. v. Micron Separations, Inc.*, 66 F.3d 1211, 1217 (Fed. Cir. 1995).

Id. at 1120. To assess whether a "word of degree," such as "substantially," renders a claim indefinite, "the court must determine whether the patent provides 'some standard for measuring that degree.'" *Enzo Biochem, Inc. v. Applera Corp.*, 599 F.3d 1325, 1332 (Fed. Cir. 2010) (quoting *Seattle Box Co., Inc. v. Indus. Crating & Packing, Inc.*, 731 F.2d 818, 826 (Fed. Cir. 1984)). A precise numerical measurement or range, however, is not required. *Id.* at 1335. Here, the court finds that one of ordinary skill in the art would understand the bounds of "substantially even" and "substantially flat" such that those terms are not indefinite.

The claims recite that the optical filter either makes "the gain substantially even with

respect to said different wavelengths" (claims 1, 6, and 9) or makes "the gain substantially flat with respect to said different wavelengths" (claim 14). The Federal Circuit has acknowledged that "ordinarily . . . 'substantially' means 'considerable in . . . extent,' . . . or 'largely but not wholly that which is specified.'" *Ecolab, Inc. v. Envirochem, Inc.*, 264 F.3d 1358, 1366 (Fed. Cir. 2001) (first & second alterations in original) (quoting *York Prods., Inc. v. Cent. Tractor Farm & Family Cent.*, 88 F.3d 1568, 1573 (Fed. Cir. 1996)). That definition of "substantially" is consistent with the use of "substantially flat" and "substantially even" in the context of the '681 Patent.

Fujitsu also has presented contemporaneous extrinsic evidence that further demonstrates the use of the term "substantially" in this context not only has sufficient meaning to a person of ordinary skill and but also describes "the invention with precision appropriate to the technology." *Verve*, 311 F.3d at 1120. Specifically, these references illustrate that the a person of ordinary skill in the art would understand that an optical amplifier would not be able to provide perfectly flat or perfectly even gain across wavelengths. For example, *Reducing Optical Power Variation in Amplified Optical Networks*, authored by Tellabs's employee Philip J. Lin, explains: "Many EDFA [Erbium Doped Fiber Amplifier] vendors have made great strides to create EDFAs with a flat gain profile. However, even the best vendors cannot promise less than +/- 0.5 dB gain variation in volume manufacturing." 1 Int'l Conf. Comm'n Tech. Proceedings 42 (ICCT 2003) (attached as Ex. A-18 to Fujitsu's Resp.) Similarly, *Understanding Fiber Optics* (4th ed. 2002), recognizes that an engineer "can equalize gain reasonably well across the spectrum, but that the gain still will not be perfectly even." Hecht, Jeff, *Understanding Fiber Optics* 285 (4th ed. 2002) (attached as Ex. A-19 to Fujitsu's Resp.). *Understanding Fiber Optics*

(5th ed. 2006), states that "[g]ain-equalizing filters" can be used, "making amplifier gain flat across the spectrum," but "[s]ome imperfections inevitably remain." Hecht, Jeff, *Understanding Fiber Optics* 563 (5th ed. 2006) (attached as Ex. A-20 to Fujitsu's Resp.). Thus, in this case, the use of "substantially" in describing either the flatness or the evenness of the gain is "necessary in order to provide the inventor[s] with the benefit of [their] invention." *Verve*, 311 F.3d at 1120.

The court has considered Tellabs's additional arguments for finding that the claims terms "substantially even" and "substantially flat" are indefinite and finds they similarly lack merit.[12] Instead, as in *Ecolab*, the court finds that "the use of the term 'substantially' . . . does not render [the phrases 'substantially even' and 'substantially flat'] so unclear such that there is no means by which to ascertain the claim scope." *Ecolab*, 264 F.3d at 1367.

Nevertheless, the court finds that Fujitsu's proposed construction fails to capture the ordinary and customary meaning of "substantially" and instead requires that the gain be "even/flat *within reasonable engineering tolerances*." The phrase "reasonable engineering tolerances," however, does not appear in either the '681 Patent's specification or its prosecution history. The court, therefore, adopts the ordinary and customary meaning of "substantially" set

[12] Tellabs also suggests that this court's previous determination that it could not construe the terms "substantially even" and "substantially flat" based solely on the intrinsic evidence supports finding that those terms are indefinite. The court disagrees. This court based its preliminary constructions on the parties' respective claim charts, but has now had the benefit of substantial presentations on both the underlying technology, the patents in suit, and the relevant legal authority, in addition to counsel's extensive arguments in support of their client's respective positions. The court's previous conclusion that extrinsic evidence was needed for the court to properly construe these terms was based on a limited record and does not indicate that these terms are indefinite to a person of ordinary skill.

forth by the Federal Circuit in *Ecolab*s and construes the terms "substantially even/flat" to mean "largely, but not wholly flat/even."

b. "optical attenuator" (claims 1, 6, 9 & 14)

The claim term "optical attenuator" appears in claims 1, 6, 9, and 14 of the '681 Patent. In its preliminary construction, the court found that it could not construe "optical attenuator" without the benefit of extrinsic evidence (Prelim. Constr. Op. 39), which the parties have now provided. Fujitsu proposes the following construction: "Ordinary meaning. A device that controls the power level of an optical signal." (Fujitsu's Resp. 25.) Tellabs, in contrast, contends that an "optical attenuator" is "a device having variable optical transmissivity." (Tellabs's Op. Br. 54.) For the reasons explained below, the court adopts Tellabs's proposed construction and construes "optical attenuator in the '681 Patent to mean "a device having variable optical transmissivity."

The parties' dispute regarding this claim term centers around whether the claimed "optical attenuator" must have a "variable optical transmissivity." According to Tellabs, the '681 Patent instructs that varying the transmissivity of the attenuator is necessary for achieving the object of the invention. Fujitsu, on the other hand, argues that Tellabs's proposed construction improperly imports limitations from the specification into the claims and excludes certain types of optical attenuators such as reflective optical attenuators.

"Transmissivity," in the optical attenuator context, refers to "the ratio of the power transmitted from the optical attenuator to the power received by the optical attenuator." (09-4530, Dkt. No. 220-7, Buckman Reply Decl. ¶ 24.) *See also McGraw-Hill Dictionary of*

Scientific & Technical Terms (4th ed. 1989) (defining "transmissivity" as "[t]he ratio of the transmitted radiation to the radiation arriving") (attached as Ex. 29 to Tellabs's Resp.). An optical attenuator can have either a variable or a fixed (i.e., constant) transmissivity. (Buckman Reply Decl. ¶ 25; Willner Decl. ¶ 44 (attached as Ex. A-3 to Fujitsu's Resp.).) A "variable optical attenuator" refers to an optical attenuator with a variable transmissivity. (Buckman Reply Decl. ¶ 25; Willner Decl. ¶ 44.) The transmissivity of a "fixed optical attenuator," on the other hand, cannot change. (Buckman Reply Decl. ¶ 26; Willner Decl. ¶ 44.) As disclosed in the '681 Patent, the transmissivity of a variable optical attenuator can be varied or maintained constant. *See, e.g.,* '681 Patent, col.7 ll.23-47. Additionally, at the time of the invention of the '681 Patent, there were various types of optical attenuators including "transmissive" and "reflective" optical attenuators. (Willner Decl. ¶ 43.)

The court notes initially that Fujitsu's argument that Tellabs's proposed construction improperly excludes non-transmissive optical attenuators appears to be based on a misinterpretation of Tellabs's construction. As Tellabs explains in its reply, the "transmissivity" limitation does not refer exclusively to "transmissive" optical attenuators but rather to a property of all optical attenuators in general. Thus, based on Tellabs's representation to the court, Tellabs's "variable transmissivity" limitation would not exclude certain non-transmissive optical attenuators, such as reflective optical attenuators, and Fujitsu did not challenge this position during the *Markman* hearing. (*See* 12/7/10 *Markman* Tr. Vol. 5, 757:20-759:11.) The court next addresses whether the "optical attenuator" recited in the claims must have a "variable transmissivity."

Turning first to the language of the claims, claims 1, 6, and 9 recite "[a]n optical

transmission system comprising . . . an optical attenuator which controls a level of the amplified WDM optical signal." Claim 14 similarly recites "an optical attenuator which controls a level of the first stage amplified WDM optical signal and outputs the controlled WDM optical signal." The claims do not refer to the optical attenuator's "variable transmissivity."

The specification, however, indicates that "variable transmissivity" of the optical attenuator is necessary to control the WDM optical signal. For example, in the "Background of Invention" section of the '681 Patent, the specification discloses that "[t]he optical attenuator passes the amplified light signal and has a variable light transmissivity." '681 Patent, col.3 ll.15-16. In describing Figure 3, the specification further instructs that this variable light transmissivity keeps the level of the amplified WDM signal constant:

> Second part 2000 includes an electrically-controlled variable optical attenuator (ATT) 64 . . . . Second part 2000 controls the total optical output of a wavelength-multiplexed optical signal to be at a constant level, without conserving wavelength dependence. More specifically, -automatic level control circuit 66 varies the attenuation, or light transmissivity, of the optical attenuator 64 so that the power of the wavelength-multiplexed optical signal, as output from first part 1000, is maintained at a constant power level corresponding to the number of channels in the wavelength-multiplexed optical signal.

Id. at col.7 ll.23-35.

Similarly, the specification's discussion of Figures 4(A) and 4(B) explains that the transmissivity of the optical attenuator is variable:

> In FIGS. 4(A) and 4(B), a warning of a change in the number of channels is received at time t1, and the number of channels are increased at time t2.
>
> Before a warning of a change in the number of channels is received (that is, before time t1), automatic level control circuit 66 varies the light transmissivity of electrically-controlled variable optical attenuator 64 to provide a substantially constant optical signal power at the output of optical attenuator 64.

Id. at col.9 ll.26-32.

Fujitsu is correct that the '681 Patent expressly explains that the optical attenuators should not be limited to the disclosed embodiments:

> [A]ccording to the above embodiments of the present invention, an optical attenuat[or] is used to provide a variable attenuation. There are many different types of known optical attenuators, and the embodiments of the present invention are not intended to be limited to any specific type of optical attenuator.

Id. at col.21 ll.58-63. The court, however, does not interpret this statement as suggesting that the attenuator may have fixed as opposed to variable transmissivity. Instead, this excerpt refers to the specific configurations of optical attenuators, such as transmissive or reflective optical attenuators, rather than the optical attenuator's transmissivity. Moreover, this statement actually reiterates that the optical attenuator "is used to provide a variable attenuation," further supporting Tellabs's position that the optical attenuator must have a variable transmissivity.

Tellabs has also presented the declaration of its expert, Dr. Buckman, as extrinsic evidence that a person of ordinary skill in the art would understand that the term "optical attenuator" has a variable transmissivity. Specifically, Dr. Buckman attests that a person of ordinary skill, having reviewed the specification for the '681 Patent, would understand that the "optical attenuator" must have a variable optical transmissivity because "the benefits disclosed in the '681 Patent . . . cannot be achieved with a fixed optical attenuator." (Buckman Reply Decl. ¶ 26.) As support for this opinion, Dr. Buckman focuses on the claim language requiring that the "optical attenuator *controls* a level of the amplified WDM optical signal." Dr. Buckman opines that "controlling," as opposed to simply "changing" the amplified optical signal, indicates that the optical attenuator must regulate the level of the amplified optical signal. (*Id.* ¶ 25.) As disclosed in Figure 3 of the '681 Patent and the corresponding description, this "control"

involves a feedback loop consisting of four elements: a variable optical attenuator 64; an optical branching coupler 54_3, a photodiode 58_3, and an automatic level control ("ALC") circuit 66. (*Id.*) To keep the level of the amplified WDM optical signal constant, the ALC circuit causes the transmissivity of the variable optical attenuator to vary. (*Id.*) A fixed optical attenuator, on the other hand, does not *control* the level of an amplified WDM optical but "merely changes the level by a fixed amount," for example, by a constant 30 percent. (*Id.*) The court finds that Dr. Buckman's declaration is consistent with the teachings of the '681 Patent on this point and provides additional evidence that the claims require an optical attenuator of variable transmissivity. Fujitsu has not identified for the court any evidence explaining how a fixed optical attenuator could "control" the level of the amplified WDM optical signal as required by and disclosed in the '681 Patent. (*See, e.g.,* Willner Decl. ¶¶ 43-44 (noting that "transmissive and reflective optical attenuators" can "control the power level of an optical signal" but not addressing whether a fixed optical attenuator can also "control the power level") (attached as Ex. A-3 to Fujitsu's Resp.).)

The court is similarly unpersuaded by Fujitsu's claim differentiation. (*See* 12/7/10 *Markman* Tr. Vol. 5, 759:1-11.) Under that doctrine, "the presence of a dependent claim that adds a particular limitation gives rise to a presumption that the limitation in question is not present in the independent claim." *Phillips*, 415 F.3d at 1315. Here, claim 4, which depends from claim 1, recites: "An optical transmission system as in claim 1, wherein an attenuation level of the optical attenuator is changed to control the level of the amplified WDM optical signal." '681 Patent, col.22 ll.29-31. Dependent claims 8, 12, and 16 include a similar limitation.

Fujitsu argues that the limitation in these dependent claims indicates that the optical

attenuator in the independent claims is not limited to a "variable" optical attenuator. If the dependent claims expressly recited a "variable optical attenuator" or an "optical attenuator of a variable transmissivity," Fujitsu's claim differentiation argument would be more persuasive. In that situation, the dependent claims would clearly imply that the optical attenuator in the independent claims was not limited to a variable optical attenuator. Here, however, the claims do not place any specific limitations on the optical attenuator but continue to refer to it generally as an "optical attenuator," thereby suggesting that the optical attenuator in dependent claim 4, 8, 12, and 16 is the same optical attenuator that appears in the independent claims. For the attenuation level of the optical attenuator to change, as required by dependent claims 4, 8, 12, and 16, the optical attenuator must be a variable optical attenuator. Consequently, the court finds that dependent claims 4, 8, 12, and 16 are consistent with Tellabs's position that the optical attenuator recited in the independent claims has a variable transmissivity.

The dictionary definition of "attenuator" cited by Fujitsu does not support the opposite conclusion. The *IEEE Standard Dictionary of Electrical and Electronic Terms* (6th ed. 1996), defines "attenuator, waveguide" as "[a] waveguide component that reduces the output power relative to the input, by any means, including absorption and reflection." *Id.* at 55 (attached as Ex. B1 to Case No. 08-3379, Dkt. No. 166.) As discussed above, Tellabs's proposed construction does not exclude optical attenuators that use absorption or reflection to reduce relative output power. Moreover, this definition merely refers to "reduc[ing]" rather than *controlling* output power as required by the language of the claims. Although an optical attenuator, in general, may reduce output power "by any means," the claims of the '681 Patent require that the optical attenuator actually "control" the output power, thereby limiting the

optical attenuator to one having variable transmissivity. The parties have not identified any evidence in the prosecution history to assist the court in its construction of the term "optical attenuator."

Consequently, as set forth above, the court construes the term "optical attenuator" in the '681 Patent to mean "a device having variable optical transmissivity."

CONCLUSION

For the reasons explained in this opinion, the court has provided its claim constructions for the disputed claim terms in the '418, '772, '773, '163, and '681 Patents. A status is set for October 20, 2011 to set further dates. The parties are strongly encouraged to discuss settlement.

ENTER:

Date: September 29, 2011

JAMES F. HOLDERMAN
Chief Judge, United States District Court